Bulletin of the Atomic Scientists

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INSIDE PUGWASH NEWSLETTER

Special newsletter for Bulletin readers on the Pugwash conferences

October vol. 3 no. 1

Pugwash holds meeting on crises prevention in Africa

Meeting in Zambia opened by President Kaunda

A special Pugwash meeting on African crises control was opened by President Kenneth Kaunda in Lusaka August 9. Convened at the invitation of Prof. L.K.H. Goma, Pugwash Council Member and Foreign Minister of Zambia, the workshop was attended by 12 participants from Africa, as well as experts on Africa from France and the USA.

Workshop requested by Pugwash's African members

In November 1984, at a Pugwash symposium on African security held in Cairo, African Pugwash participants most strongly recommended that work be done on crisis control in Africa. They proposed that this work be done primarily by African institutes and researchers with non-African experts called in as needed. Pugwash fully supports this plan, and the Lusaka meeting was the first step in its implementation.

President Kaunda supports African initiative

In his welcoming address, President Kaunda urged Pugwash to continue its work and stressed that world peace could not be assured while hunger, disease and poverty ravaged the have-not countries. He pointed out that as long as some countries were "haves" and others "have-nots" there would be no security for anyone, anywhere.

This point of view is certainly shared by many who fear one or the other of the crises which constantly erupt on the continent may draw in a nuclear power and thus lead us towards nuclear war. This concern has caused Pugwash to regard crises control as a key part of its work, worldwide. For over 30 years the scientists and academicians who make up Pugwash have bent their energies to identifying the key problems preventing us from moving away from nuclear conflagration. Crises control in the third world is now seen as a major part of this strategy.

Crisis prevention

Martin Kaplan, Secretary General, stated recently: "Although *crisis prevention* or control has been given a variety of meanings, Pugwash for the most part sees crisis as an accelerating chain of political and psychological events leading nations to the brink of war."

That is why Pugwash regards the African initiative as so important. As an outgrowth of the workshop, and others to be held in South America and Asia, Pugwash will develop procedures and linked networks of influential individuals and decision-makers in different parts of the world which can act effectively in crisis prevention and control. Efforts by others in this direction, with which Pugwash is in touch, are already underway on a bilateral basis between the USA and USSR.

Workshop members in front of the Zambian Statehouse in Lusaka: President Kaunda at center. To his left, Martin Kaplan, Secretary General of Pugwash, to his right Prof. Lameck Goma, Foreign Minister, and Prof. Eldin Galal.

Moving out and up

The African delegates agreed to work on expanding Pugwash contacts among key African political, military and professional people.

Their intent is to form a network which would monitor future crises and which would provide communications links to one another and to the international Pugwash office. As well, they will sponsor a multi-year study of the sources of African crises, and of mechanisms to deal with them. A special section will be devoted to South Africa.

Your part in forthcoming conferences

Bulletin readers are needed to support Pugwash. Without your help, and the help of people such as yourself, this vital work cannot take place.

No national government, large foundation or vested interest maintains the Pugwash movement. It is supported by interested people, people like you, who understand its work and know its value. If you haven't already done so, become a Friend of Pugwash.

Fill out the form below today, and join with the Pugwash scientists in this vital work.

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Bulletin of the Atomic Scientists

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On the cover: Illustration by Jim Ludtke. (See "Antisatellite Accord Key to Summit," "SDI: the Stability Question," and "Star Wars and Outer Space Law," pages 16–24.)

From the Editors

Stop testing

JUST DAYS after the unilateral Soviet moratorium on nuclear weapons testing went into effect on August 6, the United States conducted its tenth underground nuclear test of the year—thus flaunting by deed the moratorium proposal it already had rejected by word. Then, less than two weeks later, the Reagan Administration announced that it would proceed with the first test of a U.S. antisatellite (ASAT) weapon against an object in space.

To justify each decision, the Administration used the blatantly specious arguments that the United States must catch up to the Soviet lead and that these actions will give the Soviet Union an incentive to negotiate more seriously. This is no way to brake the arms race, much less to stop it.

In the case of the test moratorium, Jeffrey Duncan describes in this issue how the Administration first tried to take the public opinion initiative by preempting the Soviet offer (which it had already learned about) by inviting Soviet observers to a U.S. test in Nevada. Then, decrying the moratorium as "propaganda," Administration spokesmen trotted out the bogus claims that the Soviet Union has an advantage in strategic forces and had just completed an accelerated testing program which put them ahead of the United States. While such deception from this Administration is not unusual, it was disturbing to see how quickly these distortions were picked up and disseminated by major U.S. news media—despite the availability of contradictory evidence.

The August 20 announcement that the United States would continue testing its antisatellite weapon was also accompanied by hollow Administration claims. White House spokesman Larry Speakes used the old argument that the Soviets already have an operational ASAT system and the United States thus must redress this imbalance. Knowledgeable weapons scientists have repeatedly pointed out, in the pages of this magazine and elsewhere, the primitive nature of the Soviet ASAT and the fact that the United States demonstrated a similar technical capability during a test in the summer of 1984.

Moreover, since the U.S. ASAT weapon undergoing tests is highly sophisticated, it is likely to spur the Soviets to speed development of a similar weapon. Ironically, an initial result of this race will be that the United States—which is much more dependent on satellites for its communications, command, and control systems than is the Soviet Union—could find itself in greater jeopardy by pushing development of ASAT technology.

The White House concluded its August 20 testing announcement by stating: "We believe that ASAT testing can constitute an incentive to the Soviet Union to reach agreement on a wide range of issues." Not only does this display an incredible lack of understanding of the history of the arms race, but, as Leon Sigal points out in this issue, a failure to negotiate on ASATs will prevent an accord on "Star Wars" systems. Such defensive systems, Daniel Arbess emphasizes, already are proscribed by international treaties now in effect. And, in a penetrating analysis of Star Wars, Gerald Marsh shows how even the flimsiest version of such a system could cause instability in superpower relations and lead to another senseless, expensive, and dangerous escalation of the arms race. ☐

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Toward a strategy for peace

by Harrison Brown

This is the first of a series of editorials, which will appear at irregular intervals, dealing with the long-term problems of reducing the dangers presented by nuclear armaments.

SADLY, BUT NOT surprisingly, the first two rounds of the renewed arms control discussions in Geneva between the United States and the Soviet Union have ended in failure. What are we to do? Must we resign ourselves to failure after failure until one day humanity, and with it civilization, perishes?

U.S. and Soviet military-technological achievements since 1945 have been spectacular. Together both countries now possess some 50,000 nuclear warheads, along with highly sophisticated means for their delivery. But the agreements that have been made so far to lessen the dangers of nuclear war have been pitifully inadequate. We can only scoff at those who believe that we have made truly meaningful progress.

It isn't that these agreements are not important—they certainly are. But they are only a small beginning and far from what is really needed. Unless they are quickly supplemented, we might as well forget about them and await the ultimate series of fireballs.

In 40 years the United States and the Soviet Union have reached the following significant understandings: the Partial Test Ban Agreement of 1963; the Non-Proliferation Treaty of 1970; the Anti-Ballistic Missile Treaty of 1972; and the SALT II Treaty of 1979.

The Partial Test Ban appears to have been taken seriously and adhered to, at least by the signatories. A number of nations have yet to sign the Non-Proliferation Treaty, and in the meantime several new nations have acquired or are close to acquiring nuclear-military capabilities. The Anti-Ballistic Missile Treaty is now in serious danger of being abrogated. The SALT II Treaty was never ratified by the United States, and there are doubts that it will be adhered to for much longer. Indeed some observers question whether it is really being taken seriously at this time. This is a miserable record for 40 years.

Even were we to cut the time scale in half and start counting from when the Partial Test Ban Treaty was initialed 22 years ago, the record would still be miserable. When we examine all the actions that will be necessary to create a world in which people can live reasonably securely, a millennium will be required if we continue at our present pace.

Finally, and most importantly, the Soviet Union and the United States have a tacit understanding that if one side launches a nuclear strike against the other, the attacker will be totally crushed by a massive retaliatory barrage of hydrogen bombs. This capability has been given a number of labels including "massive retaliation" and "mutually assured destruction," and both nations have spent the last several decades putting themselves in a position to accomplish this should it prove "necessary."

The world has now been free of major wars—notably nuclear war—since 1945. By a major war I mean one comparable to World War II in death and destruction, when some 50 million persons were killed. The fact remains, however, that there has been no time between 1945 and the present when wars have not been in progress. These have ranged in size from relatively small altercations to the larger and more serious wars which have been waged in Korea, Vietnam, the Middle East, and Afghanistan.

Many students of the subject attribute our newly found freedom from major war to our growing dependence upon nuclear capabilities and to the near certainty of complete destruction of the attacking nation should those weapons be used. There is probably some truth in this view, but it would be foolhardy to suppose that this situation will prevail indefinitely. Everyone can imagine events which could rock the boat and bring "nuclear peace" to an abrupt end.

> *When we examine all the actions necessary to create a reasonably secure world, a millennium will be required if we continue at our present pace.*

Another important factor to keep in mind is that even were we to eliminate nuclear weapons from the earth our knowledge of how to manufacture them would not be eliminated. If another major war, using conventional weapons, were to start, it is highly likely that nuclear weapons would be made and used. In other words, while the elimination of nuclear weapons is a necessary condition for world security, it is by no means sufficient. We really must direct our efforts toward avoiding war altogether.

Nuclear weapons differ from conventional ones in many ways. But in thinking about long-term world security we cannot divorce the two: control of one necessitates control of the other. And we know from sad experience that conventional weapons are not easy to control. Nevertheless, we have no choice but to keep trying. Nothing will be accomplished by acquiescing to those who are resigned to waging war as the only solution to living on this planet securely. ☐

Washington Report

Playing chicken in Turkey

by William M. Arkin

HAS TURKEY, the proverbial "sick man of Europe" and plaything of the Pentagon, become a nuclear thorn in the Soviet Union's side? U.S. enthusiasm for Turkey's military value has never been greater. Richard Perle, assistant secretary of defense for international security policy and Turkey's principal booster, calls U.S. relations with this country "the largest, most productive and least understood program in Southern Europe." He reminds skeptics that Turkey maintains the largest military force of any NATO ally and has had the highest real increase in defense spending of any NATO nation (over 100 percent) during the last 13 years. Turkey also receives the third largest share of U.S. military assistance, behind Israel and Egypt.

U.S. military operations in Turkey are not exactly burning questions in the current defense debate. Recently revealed evidence suggests, however, that they have undergone a major change. According to an obscure publication of headquarters, U.S. Air Forces in Europe—the October 1983 "Munitions Bulletin"—the nuclear weapons mission in Turkey "is in an aggressive growth stage." The "Bulletin," recently released under the Freedom of Information Act, states that "the four MUNSS [munitions support squadrons, nuclear bomb custodians for the Turkish Air Force] are actively pursuing resumption of alert." Retired General T.R. Milton, former U.S. representative to the NATO Military Committee, also referred to the renewed alert mission in a May 1983 article for *Air Force Magazine*: "A newly resurfaced runway will complete the task [of improving military facilities], and Incirlik will resume its role as a NATO alert base."

Resumption of "alert" in Turkey means that aircraft there are loaded with nuclear bombs in peacetime and are ready to strike targets in the Soviet Union. That puts the planes on the same status as other forces, including U.S. land-based missiles, some Pershing II and cruise missiles, and some aircraft in Europe. But why place forces on alert in Turkey, with its long border with the Soviet Union? Pentagon and State Department officials declined to confirm or comment on the resumption of alert in that country.

Ever since President Kennedy's assurances to Premier Khrushchev during the Cuban missile crisis that the United States would remove its Jupiter missiles from Turkey in exchange for removal of Soviet missiles in Cuba, the issue of nuclear weapons in Turkey has been absent from public view. But today, the United States stores some 500 nuclear warheads in Turkey, and as many as 300 of them are bombs for aircraft. U.S. nuclear bombs are stored at four Turkish airbases—Eskişehir, Murted, Erhac, and Balikesir—for use by four Turkish Air Force units. The Turkish squadrons, consisting of such aging nuclear-certified aircraft as F-104s, F-4s, and F-100s, are armed with four types of bombs with yields of up to a couple hundred kilotons.

A fifth nuclear-armed airbase in Turkey, Incirlik, is the only U.S. combat base in the country. This large base is located on the southeastern coast, near Adana. One hour by air from the Soviet Union, Incirlik is the most forward deployed base for U.S. tactical forces in the eastern Mediterranean and the only permanent U.S. combat base between Italy and South Korea. It is most famous as the former home base for Francis Gary Powers and the U-2 operations which overflew the Soviet Union. At Incirlik, the United States operates F-16 aircraft which rotate from Torrejon Airbase in Spain. Operations at Incirlik have increased significantly since the signing of the 1980 Defense and Economic Cooperation Agreement between the United States and Turkey, allowing an increase in the number of aircraft assigned to Incirlik from 18 to 36.

The U.S. Army also has nuclear weapons in Turkey, allocated for support of the Turkish First and Third Armies. Custodial detachments at Cakmakli, Ortakoy, Corlu, İzmit, and Erzurum store about 190 warheads for 16 hopelessly obsolete 1950s-vintage Turkish Army Honest John short-range missile launchers (four battalions) and 32 eight-inch guns.

The presence of these nuclear weapons is conventionally justified on the ground of NATO responsibilities resulting from Turkey's "strategic" location. Earlier this year Perle stated: "Turkey's primary NATO mission is to secure the

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William M. Arkin is director of the Arms Race and Nuclear Weapons Research Project of the Institute for Policy Studies in Washington, D.C. and a contributing editor of the Bulletin.

strategic Turkish straits which provides [*sic*] the Soviet Union access to the Mediterranean from the Black Sea." The Congressional Research Service commented dryly in a recent report on U.S. bases in Turkey that "it also controls the most direct air and overland routes between the Soviet Union and the Middle East and Africa."

BUT TURKEY'S emerging role as a springboard for "horizontal escalation" and as a forward base for military operations in the Middle East provide a broader justification. Under the horizontal-escalation strategy, if the Soviet Union were to start a war in one part of the world, the United States would respond by hitting them elsewhere with conventional or nuclear weapons.

"Turkey represents an important outpost of stability and security in an increasingly volatile region," Perle stated this year. "Continued instability in Lebanon, the Iran/Iraq War, Radical Islamic Movements, insurgencies and terrorism with outside support and a growing Soviet presence are as much a security threat to the U.S. and NATO as anything we face."

The Turkish government, sharing the longest border with the Soviet Union of any NATO nation and tied to its Middle East neighbors by a common religion, has traditionally objected to the use of U.S. military facilities in Turkey for operations that go beyond NATO missions. Article V of the 1980 Agreement states that "the defense cooperation envisaged in this Agreement shall be limited to obligations arising out of the North Atlantic Treaty."

Nonetheless, a military buildup which has clear relevance outside NATO is going on there. Turkey and the United States signed an air bases operating agreement in November 1982, which allows the United States to use 16 airbases in Turkey for reinforcements. The agreement includes upgrading two airbases (Erzurum and Batman) in eastern Turkey and building a third (Muş). Planes based at Muş would be about 500 miles from Teheran and 700 miles from the Persian Gulf.

The Turkish government has publicly stated that the airbases have no connection to U.S. rapid deployment forces and that they are being constructed solely within the framework of NATO defense plans. Assistant Secretary Perle, who stated that "these bases will be used in a strictly NATO context and not for forces of the Rapid Deployment Joint Task Force" supported those claims, in part, by noting that NATO is picking up part of the tab for construction. But the Joint Chiefs of Staff responded to a written question from Congress in 1984 by stating: "Mus is essential as the base will provide significant NATO capability within 120 miles of the Soviet border. Additionally, because of the strategic location of southeastern Turkey, Muş will also deter possible Soviet expansion into the Middle East and Southwest Asia." The director of Air Force military construction also told Congress in 1983 that "the strategic value of bases in eastern Turkey became very evident to protect not only the southern flank of NATO but other contingencies."

The airbases agreement and resumption of nuclear alert, however, are not the only improvements to military forces in Turkey. The United States and Turkey agreed in 1983 to a deal for Turkish coproduction of 140 nuclear-capable F-16 fighters to replace older Turkish aircraft starting in 1988. In 1983, NATO AWACS (Airborne Warning and Control System) planes also began operations from Konya, significantly improving surveillance of the region. Modernization of the Turkish armed forces, financed by the United States at just under one billion dollars a year, is also showing results.

The actual defense of Turkey does not appear to be an overly demanding task. Admiral William J. Crowe, former commander of Allied Forces Southern Europe (and soon to be chairman of the Joint Chiefs of Staff) stated in 1983 that "high mountains, narrow passes, and a climate of harsh extremes combine to make this theatre much more favorable for defense than the others [Greece and Italy] of the region." The Turkish Army, with 570,000 troops, outnumbers an estimated 26 Soviet divisions in the region (including those in Afghanistan and facing Iran) by about two to one.

The bottom line is that the United States views the Turks, with their displays of prowess at Gallipoli in World War I and in the Korean War, as willing and reliable partners in a campaign to turn up the heat under the Soviet Union. While Turkey's incorporation into U.S. plans in the Middle East might be more sensitive domestically for the Turks, planners recognize that a war with the Soviet Union will not confine itself to NATO's borders.

The secret fiscal 1985 "Defense Guidance" spelled out some of the justifications for upgrades in Turkey. It instructed the military to "prepare and practice routine force posture responses to ambiguous warning of Soviet readying moves, while maintaining a capability to take U.S. unilateral moves pending NATO decisions." But a nuclear component of such plans, particularly alert aircraft in Turkey which can strike targets in the Soviet Union, is unambiguous. A top secret 1984 State Department "Discussion Paper" on theater nuclear forces points out some of the severe problems associated with alert aircraft: "removed from the conventional mission and fixed at a limited number of airfields awaiting nuclear release authority [nuclear armed aircraft] are probably more vulnerable to, and provocative of, a preemptive attack than before. Soviet doctrine and exercises indicate that they are aware of this vulnerability and are prepared to exploit it with large-scale nuclear attacks just prior to release."

The successful deployment of Pershing II and ground-launched cruise missiles in Europe has increasingly focused attention on operational issues. Within the government and NATO, war plans and strategy are the major interest. Outside the government, proposals for a "no first use" declaration have again attracted consideration as a means of avoiding nuclear conflict. Nuclear operations and buildup in Turkey, out of sight and out of mind, now require equal attention. Here is one example of how the political implications of the military's routine operations must be considered. ☐

Fuzzy safeguards for U.S.-China deal

by Christopher E. Paine

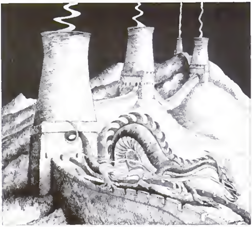
ON JULY 24 President Reagan forwarded to Congress the Agreement for Peaceful Nuclear Cooperation with the People's Republic of China. Although the formal signing of the accord the day before was heralded as the diplomatic achievement of President Li Xiannian's visit to Washington, the identical agreement was first initialed during Reagan's trip to China in April 1984.

On the first occasion, a senior official told reporters that it met all the requirements of the 1954 U.S. Atomic Energy Act. But confidence in such assurances faded rapidly within weeks of Reagan's return to Washington, and the Administration refused to divulge the actual text of the agreement to Capitol Hill.

To explain that delay, the Administration indicated that it had received new intelligence information that China might be assisting Pakistan's clandestine nuclear weapons program and that it was seeking more concrete nonproliferation assurances from China before signing the agreement and forwarding it to Congress. Had Reagan sought congressional approval of the agreement when it was first initialed, some observers believe Congress would have compelled him, under the weight of the classified evidence, to invoke Section 129 of the Atomic Energy Act, forbidding nuclear cooperation with any country engaged, *at the time the agreement is sought,* in helping a non-nuclear-weapons state develop nuclear weapons and refusing to terminate such assistance.

Another possible explanation is that what had once looked like an easy diplomatic trophy for display on Reagan's 1984 reelection bandwagon suddenly became a liability as reports about the agreement's vague language and the China-Pakistan connection leaked out. The president's political strategists realized that the agreement was sure to be skewered by nonproliferation advocates in Congress, to say nothing of conservatives in the Taiwan lobby, and the agreement was shelved until after the election.

Instead of obtaining China's written pledge not to assist other countries to acquire nuclear weapons, the Administration reportedly has spent the last 18 months acquiring highly classified assurances that the Chinese technicians purportedly working at Pakistan's renegade Kahuta enrichment plant have disappeared, and that China is no longer exporting unsafeguarded supplies of heavy water and enriched uranium to other threshold nuclear-weapons states.



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These assurances are set forth in a secret memorandum presented by Ambassador-at-Large Richard T. Kennedy to responsible Chinese officials during a meeting in Beijing in June. While declining to sign, the officials reportedly nodded their assent, and Kennedy—formerly an avidly pro-nuclear-power member of the Nuclear Regulatory Commission—raced back to Washington to hammer out an interagency "consensus" in time for President Li's July visit.

"What is this memorandum?" queried Representative Edward J. Markey, Democrat of Massachusetts, as he held up a copy of the classified document while offering testimony before the House Foreign Affairs Committee on July 31. "The Chinese did not write it. The Chinese did not sign it. The Chinese did not agree to it. Among the diplomatic set, this memorandum is known as a 'non-paper.' The Chinese reply, such as it may have been, is a 'non-answer,'" Markey said.

THE LACK OF explicit written nonproliferation assurances is by no means the only, or even the most serious, gap in the agreement. Ironically, while the president is a stickler for verification of agreements with the Soviets, this agreement has no verification arrangements at all. There is nothing more "on-site" than the system of seals, cameras, and materials balances collectively known as "safeguards," commonly administered by the International Atomic Energy Agency.

Under the provisions of the Atomic Energy Act, China,

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as a nuclear weapons state, is exempted from the specific IAEA safeguards requirements. However, contrary to the U.S.-Chinese agreement's implication, China is not exempted from all safeguards. The Act requires every agreement to include "a *guaranty* by the cooperating party that safeguards as set forth in the agreement for cooperation will be maintained with respect to all nuclear materials and equipment transferred."

Contrast that language with the fuzzy "safeguards" provision of the Administration's China agreement: "The parties recognize . . . that bilateral safeguards are not required . . . . The parties will use diplomatic channels to establish mutually acceptable arrangements for exchanges of information and visits."

A preliminary legal review of the agreement by Washington attorney Eldon V.C. Greenberg for the Nuclear Control Institute argues: "Not only does this provision not call for anything rising to the level of 'safeguards' in the conventionally understood sense of the term, but, in any event, even the establishment of these arrangements is left to depend upon the outcome of future negotiations."

The Atomic Energy Act also requires a clear guarantee that no nuclear material transferred to a country or derived from U.S. exports will be reprocessed, enriched, or otherwise altered without the prior approval of the United States. On this key point, however, the agreement does nothing more than commit both sides to discussions about Chinese plans for reprocessing. If long-term arrangements for reprocessing cannot be worked out within six months of an initial request, China is obliged to refrain from reprocessing on an "interim" basis only if the United States determines that such activities would "prejudge" long-term arrangements for undertaking reprocessing or "adversely affect cooperation" under this agreement.

Moreover, the accord requires consultations on reprocessing to be "carried out promptly and mutual agreement reached in a manner to avoid hampering, delay, or undue interference in their respective nuclear programs"; and provision is made "to undertake such activities on an interim basis" pending agreement on longer-term arrangements. The agreement further states: "Nothing in this article shall be used by either party to inhibit the legitimate development and exploitation of nuclear energy for peaceful purposes in accordance with this agreement."

"What was an unqualified veto right [for the United States], in other words, has been made subject to standards found nowhere in U.S. domestic law," Greenberg concludes. "Indeed, should the U.S. move to reject Chinese requests for reprocessing, the Chinese would almost surely rely on these provisions to challenge the U.S. position."

There can be only one reason for these excursions into the netherworld of State Departmentese: the Chinese are not prepared to submit to the requirements of U.S. law under the Atomic Energy Act. This impression is reinforced by the following caveat in the section of the agreement entitled "Scope of Cooperation": "The parties recognize, with respect to the observance of this agreement, the principle of international law that provides that a party may not involve the provisions of its internal law for its failure to perform a treaty."

Under U.S. law, however, an agreement for nuclear cooperation is not comparable to a "treaty" obligation, which is subject to ratification by a two-thirds majority of the Senate before going into effect. It is an executive agreement which automatically takes effect after 90 days of continuous legislative session, unless disapproved by a veto-proof majority of both houses of Congress.

Since the international legal principle is weakened by the relative ease with which such agreements can be entered into, U.S. domestic law, which is subject to far more rigorous tests, should be accorded legal precedence. This is clearly the understanding which has informed the negotiation of previous agreements for nuclear cooperation. The recently approved agreement with Sweden, for example, simply states: "Cooperation pursuant to this agreement . . . shall be in accordance with the provisions of this agreement and the applicable treaties, national laws, regulations, and license requirements in force in their respective countries."

In Greenberg's view, the caveat contained in the U.S-China agreement "appears to commit the United States to fulfill all obligations under the Agreement, even if some of those obligations are contrary to existing domestic U.S. law, or if nuclear export law and regulations should change in the future."

THERE IS MORE at stake in this matter than the possible sale of nuclear equipment to the People's Republic of China. The last five years have witnessed a steady deterioration in the will of the executive branch to implement this nation's nuclear nonproliferation laws. One must ask what the future holds if such vague, elastic, and unverifiable "frameworks for cooperation" become the standard for nuclear negotiations, and whether the United States is prepared to sacrifice its long-term security interest in reducing the global spread of nuclear weapons to the illusion that prosperity awaits those who light the lamps of China.

The recently adopted Proxmire Amendment to the Export Administration Act amended the Atomic Energy Act to establish a procedure for handling an agreement for nuclear cooperation which does not meet the requirements of U.S. domestic law. The foreign affairs committee of either house of Congress can recommend to the president that he resubmit the agreement with an exemption from the safeguards and prior consent criteria of the Atomic Energy Act. If the president agrees, this would trigger a requirement, akin to ordinary legislation, for majority affirmation of the agreement by both House and Senate before it could take effect.

Regardless of their views on the ultimate disposition of this agreement, all members of Congress should be willing to uphold the integrity of U.S. nonproliferation law by recognizing the clearly exceptional character of this agreement and then demanding consideration of its approval by majority vote of both houses. ☐

How many Soviet tests make a flurry?

by Jeffrey S. Duncan

IN A JULY 29 briefing, White House Press Secretary Larry Speakes suddenly announced that President Reagan was making an "unconditional" and "unilateral" offer to the Soviet Union to come to the United States to monitor a U.S. nuclear weapons test. "As a demonstration of our seriousness," Speakes explained, the president was inviting "a Soviet team to observe and to measure a nuclear test at our Nevada test site." The Soviet team would be allowed to "bring any instrumentation devices the Soviet Union deems necessary to measure the yield of this test." Such an offer, Speakes concluded, "clearly demonstrates the U.S. intention to go the extra mile" to begin addressing the "serious problem" of "putting into place truly verifiable and durable limits on nuclear testing."

Following this unexpected announcement, National Security Adviser Robert McFarlane revealed that—by sheer coincidence—the Soviet Union was unveiling a nuclear weapons testing moratorium proposal that same day. The Soviet proposal, privately communicated to the United States the day before, initiated a five-month unilateral moratorium on all Soviet nuclear testing, which could be extended indefinitely if the United States was also willing to suspend its underground nuclear explosions.

Denying that the U.S. inspection proposal was designed to defuse the impact of General Secretary Gorbachev's offer, McFarlane announced that the Administration had no intention of entering into a nuclear explosion halt until it had redressed what it believed to be a Soviet advantage in strategic forces.

He then went on to issue a charge that would play a prominent role in subsequent Administration efforts to discredit the Soviet offer: that just prior to initiation of its unilateral testing halt the Soviets had actually accelerated their nuclear testing program. "Clearly, this was designed to put the Soviet Union in a position not to need to test over the next five months . . . and to break out on an accelerated schedule." Drawing an analogy between the current Soviet offer and a bilateral halt that had ended in 1961 with "the largest series of high yield explosions in history." McFarlane warned that within a few months, the Soviets might "break out on an accelerated schedule—as they did in 1961—after that time, if they choose, without real cost to the Soviet programs."

In an ABC "Nightline" interview, McFarlane expanded on this theme, declaring: "In fact, the appearance, the reality that this was a contrivance is proven, I think, by the fact that in the past few weeks they've accelerated the number of tests that they've had so that they wouldn't need to test for the next five months or so." He cited CIA figures indicating that the Soviets had conducted three nuclear explosions "in a matter of days from this broadcast." Hinting that these tests were only the tip of an iceberg, McFarlane then quickly invoked classification to avoid any further questioning on the subject, explaining that "what we know about Soviet testing is not a matter that we would normally make public."

Although McFarlane's interviewer, Ted Koppel, had the current Department of Energy figures listing four Soviet tests in 1985, he did not press McFarlane to explain the discrepancy between what the CIA and the Department of Energy were saying about Soviet nuclear explosions. Instead, he conceded the point, saying, "Well, let's assume—and we have good reason to assume it because you say so . . . that indeed the Soviets have been jamming it all in and that they've now done whatever they want to do for the time being."

Much of the national media adopted the same unquestioning attitude. Editorial writers around the country quickly seized on the reported flurry of Soviet nuclear explosions to discount the significance of Gorbachev's offer. In an editorial which poured scorn upon the notion of a testing moratorium, the *New York Times* wrote that the Soviet offer "would ring hollow even if it had not come immediately after an energetic series of Soviet test explosions." The Philadelphia *Inquirer*, while favoring an eventual ban on all nuclear explosions, pointed to the Soviets' having "just completed a round of tests" as evidence that their offer was pure propaganda.

In Congress, Administration supporters were quick to use the reported testing flurry to discredit Gorbachev's initiative. The morning after the "Nightline" interview, Representative William Broomfield of Michigan, ranking Republican on the House Foreign Affairs Committee, denounced the moratorium offer as "another exercise in Soviet dishonesty." Describing it as something that "smells like leftover borsht," Broomfield concluded that "coming just a week after the Soviets set off three nuclear explosions, it makes you wonder if there really is anything new in Moscow other than the smiling face of Gorbachev."

Within a few days, the Department of Energy increased the number of announced Soviet nuclear tests from four to five, lending further credence to McFarlane's claim of a July testing acceleration. CIA liaison officer Pat McGowan confirmed that at least three Soviet test explosions had been detected in July but would give no further details about what was now being described as an "orgy" of Soviet testing.

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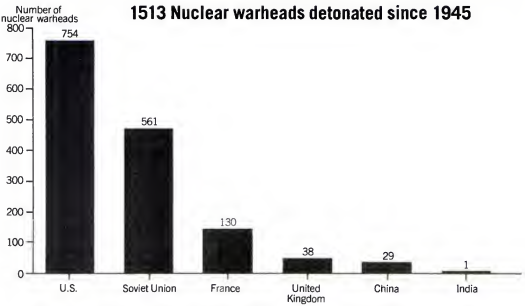

Sources: *SIPRI Yearbook 1985*; Hagforg Observatory; U.S. Department of Energy

But data available from the Department of Energy and the Swedish National Defense Research Institute (which monitors nuclear explosions for the Swedish government) show that there was no sudden acceleration in Soviet nuclear explosions. The Soviet Union conducted three nuclear test explosions in July. Two of these were conducted at the Soviet test site in East Kazakhstan near Semipalatinsk and are undoubtedly part of their military program. The other test was conducted in the northeastern part of the Soviet Union, outside the normal military testing sites. This test is believed to be a "peaceful nuclear explosion" (PNE). The Soviets have long had an active PNE program, and according to a Swedish expert, "It is the first time they have carried out a peaceful explosion there. . . . It is difficult to tell, but the explosion may be part of a project to store natural gas."

Three tests in one month hardly constitute a sudden acceleration in the Soviet testing program, nor do they bring the yearly total to a level consistent with previous years. By way of comparison, at the same time last year, the Soviets had already conducted 11 tests, consisting of eight presumed weapons tests and three PNEs. Between January and July of 1983, they conducted 13 tests, six of them military explosions and seven PNEs. Between 1980 and 1984, the Soviets have averaged about 25 nuclear explosions per year. If anything, this year's Soviet testing program is less energetic than previous years'.

The Administration cannot seriously believe that three tests in one month represent a sudden acceleration in the Soviet program, or that in stopping at seven tests the Soviets have completed their program for the year. Nor can it plausibly argue that the Soviets are ahead of the United States in nuclear testing. Overall, the United States continues to lead the Soviets by 754 to 561 nuclear explosions. The United States conducted nine nuclear explosions in the first seven months of 1985, to the Soviets' seven, and the new U.S. warheads being tested represent more sophisticated technologies than their Soviet counterparts. [The United States conducted a tenth test on August 17, after the Soviet moratorium had gone into effect.] As the Republican chairman of the Senate Intelligence Committee, David Durenberger of Minnesota, recently remarked: "If the United States and the Soviet Union could not test their nuclear devices, neither country could make potentially destabilizing qualitative improvements in their nuclear weapons. . . . A Comprehensive Test Ban Treaty would stop menacing Soviet developments while preserving the technological edge the United States enjoys in their nuclear warheads."

McFarlane's mythical testing flurry represents the same kind of disregard for the facts that has characterized much of the Reagan Administration's response to previous calls for arms control. Three years ago, when support for a nuclear weapons freeze began sweeping across the country, the Administration responded with patently ridiculous declarations that a freeze would threaten U.S. security since, in Reagan's words, "On balance the Soviet Union does have a definite margin of superiority." Today, unable to justify its opposition to a simple halt in nuclear explosive testing and unwilling to resume negotiations for a comprehensive test ban treaty, the Administration is again resorting to scare tactics and disinformation. ☐

Military R&D and the civilian economy

Although the economic effects of large military R&D programs have been mixed, there is evidence that they have stymied U.S. productivity growth and contributed to the decline of U.S. performance in world commercial markets.

by Judith Reppy

UNDER THE FIRST five years of the Reagan Administration military spending has risen from $157.5 billion to $253.8 billion—38 percent in real terms—with further large increases requested.[1] Just as important, this recent surge comes after nearly three decades of sustained high levels for defense budgets.

Military spending and programs should be judged against the United States' needs for military power to support its national security and foreign policy goals. But the expenditure of such large sums will also have an impact on the civilian economy, and, in peacetime at least, consideration of the economic impacts is relevant to decisions on the defense budget.

Most discussions of the economic consequences of U.S. military spending focus on the immediate fiscal impacts of the defense budget, particularly its effect on the federal deficit, employment, and the rate of inflation. In other words, the concern is for the macroeconomic impact over a period that coincides roughly with the time until the next election. In this time frame the economic effects of defense spending are mostly indistinguishable from those of any other large governmental program, and are sensitive to other fiscal policy decisions—for example, those with respect to taxation.

One way of assessing the so-called opportunity costs of the military budget is to determine what alternative government programs, or private goods and services, are not produced because of the claims of the military on the federal budget and on the real resources of the economy. Under the Reagan Administration the budgetary trade-off between military and domestic spending programs has been particularly sharp: the military has grown from 23 percent of total outlays to 29 percent, while other federal spending, exclusive of debt service, decreased from 66 percent to 56 percent between fiscal 1981 and 1986.[2]

But what are the long-term effects of military spending on the U.S. economy? What consequences may we expect from over 30 years of high levels of defense budgets? To answer these questions we must examine the effects of military spending on specific industries and economic sectors, as well as the effects on technological change and innovation.

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THE LONG-TERM economic effects of military spending are likely to arise in at least two conceptually distinct ways:

- First, the pattern of resource allocation may itself be quite stable, so that there is a continuing impact on those sectors and regions of the economy that attract military spending. This has indeed been the case in the United States during the postwar period. Outlays have been concentrated in a few industries—particularly aircraft, missiles, electronics, communications equipment, and shipbuilding—and in these fields they account for a very high fraction of industry output. These industries have benefitted by the Reagan buildup, which has been heavily weighted toward investment in new weapons. The regional distribution of prime contracts has favored the Far West and South Atlantic states over the Northeast and Midwestern regions.

The pattern has not changed much over the whole postwar period. Spending on aircraft has declined relatively, but other categories have held steady. This stability in spending patterns has nourished the group of defense contractors commonly identified as members of the military-industrial complex, and their ability to respond to new technology and military requirements has maintained the same group of firms in leading positions in the defense market. This organizational stability is clearly one long-term result of military spending, and it has had important consequences for the political environment in which budget decisions are made.

- The other kind of long-term effects are inherently so, in that they take a considerable period to mature after the original stimulus. One example is the increased supply of scientists and engineers in response to job opportunities created by military spending. Perhaps most important is the technological change that results from large-scale programs for military research and development (R&D), because technological change is a major vehicle for structural change and growth in the economy.

Military-related programs have dominated government-supported R&D since World War II, especially in the early part of the postwar period when they absorbed nearly 90 percent of total funds. Currently, 70 percent of government funding and about 30 percent of total government and private spending on R&D are allotted to military projects, while space R&D adds another 5 to 6 percent. For the postwar period as a whole, roughly 42 percent of the United States' scientific workforce has been employed in military-related projects.[3]

Several consequences flow directly from this allocation of resources. It is in the nature of R&D activities to have their greatest effect in the future. In the short run they absorb resources, particularly of scientific and engineering personnel. In the long run they create a quite unpredictable set of new knowledge, inventions, and—in the case of successful innovation and diffusion—new products, and increases in economic productivity. Despite the uncertainty of outcomes and the possibility of technological crossovers between industries and sectors, we can expect that the direction of technical progress will be influenced by the allocation of R&D resources.

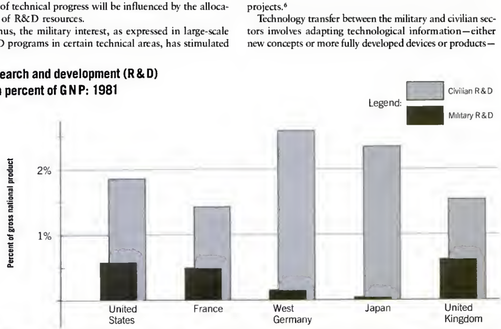
Thus, the military interest, as expressed in large-scale R&D programs in certain technical areas, has stimulated development of those areas over others. Throughout much of the postwar period, America's technological lead in aircraft, computers, and microelectronics has owed much to the military services, both as a source of R&D funds and as customers for the new technology. By the same token, other areas, such as railroad technology, have been neglected.

FROM THE POINT of view of the economy as a whole, the large military R&D programs are beneficial only if their outputs find their way into the civilian sector. Proponents of military programs hold that there have been substantial technological spinoffs. Examples are jet engines, computers, and nuclear power. Currently, claims are being made for the potential benefits of "Star Wars" research for such civilian problems as acid rain.[4] Furthermore, it is argued, federal funding would not have been available under any rubric other than national security, so the military programs should be seen as net additions to the civilian effort rather than as substitutes.[5]

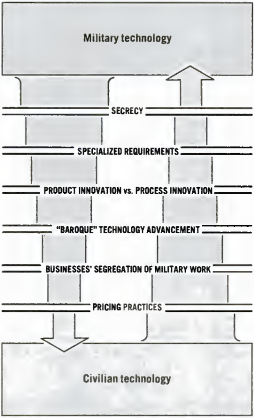
Critics of military R&D emphasize the opportunity costs involved in the drain of scientific resources away from civilian uses. They deny that spinoff is an important phenomenon and argue that the increasingly exotic character of military technology makes transfer to the civilian economy ever less likely. Above all they argue that the very large sums of money spent on military programs cannot be justified by gains to the civilian economy, since presumably those gains could have been achieved more cheaply by dedicated projects.[6]

Technology transfer between the military and civilian sectors involves adapting technological information—either new concepts or more fully developed devices or products—

Research and development (R & D) as a percent of G N P: 1981



Sources: National Science Foundation, *National Patterns of Science and Technology Indicators 1984*, NSF 84-311, p. 37; *SIPRI Yearbook 1984*, Table 6.4.



Barriers to diffusing technology between military and civilian sectors

Military technology
SECRECY
SPECIALIZED REQUIREMENTS
PRODUCT INNOVATION vs. PROCESS INNOVATION
"BAROQUE" TECHNOLOGY ADVANCEMENT
BUSINESSES' SEGREGATION OF MILITARY WORK
PRICING PRACTICES
Civilian technology

Specialization of components or the desire to prevent transfer of dual-use technologies via civilian trade impede civilian uses of military technologies.

Informational graphics: Michael Yanoff, United States

to a new context. Spinoff is thus a special case of technological diffusion in which the spread of a new technology is not among firms of a given industry or even among industries, but between the military and civilian sectors of the economy. The dividing line runs across firms in a number of industries and in some cases across divisions within a firm.

Even stating the problem in this form is based on an untested hypothesis: that there is a distinction between military and civilian technologies. Although the distinction appears fairly clear for such military end products as nuclear missiles and submarines, it is less obvious for other items such as jet aircraft, helicopters, or many of the technologies for components of military systems, such as computers. These military products are distinguished from their civilian counterparts by greater ruggedness, specialized components, and higher cost; but the underlying technologies are essentially the same, even though adapting them to civilian use may require considerable additional work. Ironically, to the extent that there is a shared technology base, the problems of encouraging diffusion are replaced by concern over controlling the spread of dual-use technology to the Soviet Union through trade in civilian goods.

We lack empirical studies of the military-civilian distinction in the diffusion of new technology, but from the general literature it is possible to determine the critieria that are likely to affect the rate of diffusion between the two sectors.[7] Barriers to the diffusion of technology from the military to the civilian sector—and vice versa—include:

- Military secrecy, which limits the exchange of information about technical aspects of classified projects to those with a "need to know."
- Special military requirements, usually expressed as military specifications, which are not relevant to civilian applications. An example is the military interest in developing electronics that are hardened against the effects of nuclear explosions.
- The emphasis in military programs on product innovation over process innovation, since military products are less likely to have civilian applications than improvements in manufacturing technology would have.
- The tendency for military products to embody very advanced "baroque" technology, unsuited to civilian markets. Ashtrays made of 11 separate parts are a grotesque example of this tendency.
- The common practice in large, diversified firms of segregating their defense business into separate divisions, to facilitate dealing with special government procurement and accounting regulations. This reduces the opportunities for cross-fertilization of civilian and military projects.
- The pricing practices for military products, which result in inflated prices that may discourage commercial interest in the new technologies.

On the positive side, military interest in a new technology can insure that its development is pushed and that it is incorporated into final products more rapidly than would otherwise be the case. For example, the early use of integrated circuits in the Minuteman ballistic missiles and the Apollo space program was important in popularizing the new technology. The government bought virtually the entire output of the new industry in its first years of production, assuming the risks of introducing the new technology by providing a guaranteed market and by being willing to pay the high prices charged for the first integrated circuits.

The rate of diffusion of military innovations to the civilian sector may also be enhanced by the very fact that military technology is so advanced. It has been shown that diffusion proceeds more rapidly in firms with large R&D programs, which are more common in high-technology industries. These programs increase the availability of information about new technology and help adapt it to local circumstances. This factor may partially offset the barriers to diffusion posed by secrecy and specialization in defense firms.

GIVEN THE LACK of a comprehensive data base on sources of innovation and rates of diffusion, it is impossible to reach a definitive judgment on the relative importance of spinoff effects. Individual case studies do not offer a basis for generalization since they are almost all success stories. But it seems probable that such effects are not numerous or important enough to serve as a justification for the large military R&D budget, if only because most of it is allotted to engineering development of specific weapons. Spending on the technology base, where secrecy is least and the potential for crossover is greatest, is only about 10 percent of the research, development, testing, and evaluation budget.

It may be argued that the purpose of military R&D programs is to develop new, more lethal weapons, not to improve economic performance in the civilian economy, in which case the question of spinoff becomes irrelevant. But for the civilian economy, the loss of the scientific and engineering resources now devoted to military programs is only partially offset by the possible civilian application of some new technology. And the same is true for the effect of military funding on the long-run supply of scientific personnel. The smaller the spinoff effects, the larger the real costs to the economy of the military R&D programs.

A different approach to the question of the impact of R&D programs on the U.S. economy has been taken by those economists who have been analyzing the relationship between R&D spending and the slowdown in the rate of growth of productivity during the 1970s, using data at the industry and firm level.[8] Some of these studies differentiate between private and government-funded R&D, so that it is possible to apply their findings to the military R&D issue. From statistics on government funding of R&D it is clear that most federal contracts to industry for R&D are military-related.

The studies' general findings demonstrate a robust positive effect of company-financed R&D on productivity growth, but federal contract R&D has a zero or even negative effect. Some have argued that, while federal contract R&D may have no direct effect on productivity, it has indirect favorable effects by inducing additional company-financed R&D.

Frank Lichtenberg of Columbia University has pursued this question, using employment of scientists and engineers as his measure of input to avoid some of the measurement problems involved in deflated dollar series.[9] He finds that an increase in employment for federal R&D contracts is accompanied by a decrease in the numbers of scientists and engineers working on company-financed R&D programs. These data thus strongly suggest a competitive rather than complementary relationship between federal and company-financed R&D. They are consistent with the institutional features of the defense industry, especially the Independent Research and Development program. This program, which reimburses defense contractors for inhouse R&D, is often justified as a means of keeping scientists and engineers busy between government contracts.

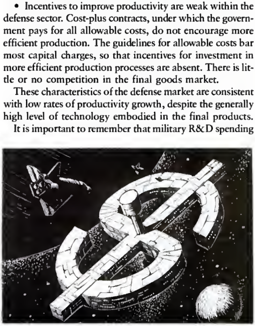
What are the reasons for the apparent failure of government contract R&D to lead to productivity gains like those attributed to company-financed R&D? Part of the answer may lie in measurement errors: because available price deflators are known to be imperfect we do not know whether real productivity changes are greater or smaller than the estimates we have. It is likely that problems of adjusting for quality changes are particularly severe for goods produced for a government buyer. Quality improvement in new weapons, for example, presumably is related to increased lethality, a characteristic that does not have a market price in the usual sense and is not measured in the official deflator.

There are reasons, however, to suspect that a real phenomenon underlies the measured differential in productivity gains between federal contract R&D and company-funded R&D:

- Military R&D spending is largely for building and testing prototypes of actual weapons. Program stretchouts are common; design changes are frequent; "gold-plating" is a well-known characteristic of this development activity. There is little reason to think that these programs represent an efficient transformation of economic resources into more productive goods, even after allowing for the measurement difficulties.
- Military programs are heavily biased toward product rather than process innovation. The Defense Department's manufacturing technology program, for example, was only $210 million in fiscal 1984, compared to its research, development, testing, and evaluation budget of $25.2 billion.
- Incentives to improve productivity are weak within the defense sector. Cost-plus contracts, under which the government pays for all allowable costs, do not encourage more efficient production. The guidelines for allowable costs bar most capital charges, so that incentives for investment in more efficient production processes are absent. There is little or no competition in the final goods market.

These characteristics of the defense market are consistent with low rates of productivity growth, despite the generally high level of technology embodied in the final products.

It is important to remember that military R&D spending



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is not spread evenly across the economy. Rather, the activities it nourishes are concentrated in a few technologies of specific military interest. This is not to deny that some military R&D funds are spent on almost every imaginable technical field; the program is indeed very broad. But most of the resources, particularly at the development stage, are devoted to a few areas, and the concentration of resources has led to differentiated impacts on various industrial sectors. The favored industries are, not surprisingly, the same (except for shipbuilding) as those receiving the bulk of military procurement dollars. The long-run consequence for the economy is to encourage growth along technological lines that have their origins in military interest.

THERE IS ANOTHER dimension to the question of the long-term effects of military spending. International trade has become increasingly important to the United States, with exports growing from 3.6 percent of gross national product (GNP) to 8.4 percent between 1950 and 1980. Military outlays have an obvious, if indirect, impact on U.S. performance in international markets today, when huge budget deficits are being underwritten by a strong dollar and the willingness of foreigners to hold dollar balances. It is less obvious, but probably ultimately more significant, that the competitiveness of U.S. products in world markets is affected by the rate of innovation and productivity increases, which in turn are influenced by military spending, especially for R&D.

Although total R&D spending in the United States dwarfs that of other countries, both absolutely and as a percentage of GNP, the picture for spending for civilian R&D is less clear (see graph, page 11). Both Japan and West Germany spend a higher percent of GNP on civilian R&D than does the United States, and it is no comfort that the only country that exceeds the United States in fraction of R&D resources allocated to the military is the United Kingdom.

Advances in military technology do generate foreign exchange through military sales abroad. Arms exports, however, are only 4.5 percent of total U.S. exports.[10] Far more important to the balance of trade is the performance of U.S. civilian manufactures on international markets, and here the United States has steadily been losing market share. Japan's penetration of U.S. domestic markets for consumer goods—well underway before the current rise in the value of the dollar—is attributable in part to that country's success in adapting technology to commercial markets.[11] Spinoff from U.S. military technology to civilian end uses would have to be substantial indeed to offset the advantage that Japan has achieved by focusing its technological resources on civilian goods.

The United States easily dominated world markets for high technology products for many years after 1945 largely because its natural competitors were still recovering from the war. In that situation, the relatively large burden of U.S. military spending was not a handicap in international trade. The pattern of military spending and institutions that was established then, however, is now a liability. In today's more competitive international markets the drain of military spending on available resources and the impact of military R&D on future technological change and productivity may significantly affect the United States' performance in international trade. Ironically, U.S. military allies, who share the benefits of large U.S. military expenditures, pose the greatest threat to the United States in international markets.

THE LONG-RUN consequences of America's vast military spending since the early 1950s can be analyzed under three categories, the first two of which are mutually reinforcing:

- The relatively stable pattern of military demand in terms of the defense firms, industries, and geographic regions involved has influenced the structure of U.S. industry.
- Military spending for research and development has dominated the national R&D program and thereby influenced the direction of technological change.
- The effects of military spending on economic performance have been mixed. Available evidence is inadequate for making a definitive judgment on the value of technological spinoff to the civilian economy. Some evidence suggests that federal contracts for R&D do not yield improvements in productivity. Furthermore, it seems likely that the U.S. concentration on military technologies at the expense of civilian-oriented R&D has contributed to the relative decline of its performance in world markets for commercial goods. The long-run effects on economic performance are not susceptible to easy quantification. But they deserve more attention in the national debate over military spending than they have received because, for better or worse, they are the permanent legacy of our military economy. ☐

1. Defense Budget Project, *The FY 1986 Defense Budget: The Weapons Buildup Continues* (Washington, D.C.: Center on Budget and Policy Priorities, April 1985), Table 6.

2. Ibid., p. 51.

3. National Science Foundation, *National Patterns of Science and Technology Resources, 1984*. NSF 84–311 (Washington, D.C.: 1984), p. 36; Congressional Budget Office, *Research and Development Funding in the Proposed Fiscal Year 1985 Budget,* Special Study (Washington, D.C.: March 1984), p. 4.

4. "'Star Wars' Science Expected to Spawn Peaceful Inventions," *New York Times*, April 2, 1985, p. C1.

5. Examples of this position include the Annual Statements of the Undersecretary of Defense for Research and Engineering. See also Jacques S. Gansler, *The Defense Industry* (Cambridge, Mass.: MIT Press, 1980), p. 21.

6. Robert DeGrasse, *Military Expansion, Economic Decline* (New York: Council on Economic Priorities, 1983), chap. 3.

7. See Anthony A. Romeo, "Interindustry Differences in the Diffusion of an Innovation," Ph.D. thesis, University of Pennsylvania (1973), pp. 13–14.

8. See Zvi Griliches, *R&D, Patents and Productivity* (Chicago: University of Chicago Press, 1984), esp. chaps. 19, 20, 21.

9. Frank Lichtenberg, "The Relationship Between Federal Contract R&D and Company R&D," *American Economic Review* (May 1984).

10. U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers 1972–1982* (Washington, D.C.: April 1984), p. 91.

11. Kenneth Flamm, *Technology Policy in International Perspective,* Brookings General Series Reprint 406 (Washington, D.C.: Brookings Institution, 1984), p. 42.

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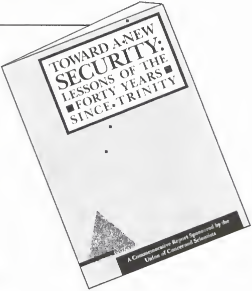
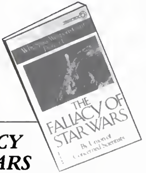

TOWARD A NEW SECURITY: LESSONS OF THE FORTY YEARS SINCE TRINITY
A Commemorative Report Sponsored by the Union of Concerned Scientists

TOWARD A NEW SECURITY: LESSONS OF THE FORTY YEARS SINCE TRINITY

The atomic age began in July 1945 with the first atomic blast, code-named Trinity. Have nuclear weapons—now numbering 50,000—brought us more security? A-bomb scientists Philip Morrison and Hans Bethe, with other defense experts, address this pivotal question in a commemorative report.



THE FALLACY OF STAR WARS

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Antisatellite accord key to summit

Willingness to negotiate an ASAT ban may be the one remaining U.S. position that will encourage progress at the negotiating table and open the way for a broader arms limitation accord.

by Leon V. Sigal

DESPITE THE Reagan Administration's best efforts to play down prospects for the November summit in Geneva, the president's meeting with his Soviet counterpart does present a real opportunity for a breakthrough on strategic arms control—the last Reagan is likely to have.

If the Administration, however, continues to accelerate development of its new weapons and refuses to trade away any of them, it will guarantee a rerun of its earlier misadventures in Geneva when it put neither MX nor Pershing II on the negotiating table in START or INF (intermediate-range nuclear forces) talks. The sterility of the opening rounds of the new talks in Geneva strongly suggests that this earlier lesson has yet to be absorbed.

Instead, early in the year, the Administration was quick to credit its military buildup and inflexible negotiating style with bringing about a resumption of talks. "Now," the president declared in his State of the Union address, "our determination to maintain a strong defense has influenced the Soviets to return to the bargaining table." If this claim was just another example of the president's flair for the dramatic, it was no more self-serving than the political hyperbole that his predecessors have used in their public pronouncements on arms control. But if it reflects his Administration's private assessment of Soviet behavior, it may mislead him into a repeat performance at the summit, this time with far graver political and military consequences.

Politically, it will further undermine support for U.S. nuclear doctrine at home and abroad and exacerbate relations with the United States' allies. Militarily, it will make the strategic balance more precarious than it already is, increasing the chances of nuclear war. These consequences flow from the likely Soviet reaction to Administration moves on the negotiating and weapons development fronts.

IF THE ADMINISTRATION is to avoid these results and open the way to a breakthrough at the summit, the antisatellite (ASAT) program provides the key.

While evidence for their motives is, as always, too inconclusive to support categorical assertions, the Soviets seem to have had two main reasons for returning to Geneva—one substantive and one political. On the substantive level, they want to ban further testing and deployment of antisatellite weapons. ASATs threaten each side's capabilities for monitoring the other's military deployments and activities and for exercising command and control over its own forces. Thus ASATs would probably be the first shots fired in the event of nuclear war.

The Soviets also want an ASAT ban because it would provide a way to close one major loophole in the ABM Treaty: some components of ballistic missile defenses can be tested in the guise of testing an ASAT. (Another major loophole in the Treaty—permitting tests of air-defense missiles with an anti-tactical-missile capability such as the U.S. Patriot and its Soviet equivalent, the SA-12—could be closed by agreement in the Standing Consultative Commission if the two sides so desired.)

Current Soviet interest in limiting ASAT is whetted in part by an active U.S. program to develop an advanced ASAT, one technologically far superior to the Soviet ASAT. Unlike the Soviet version, it has the potential to threaten satellites not only in low orbits around the earth but also in geostationary orbits farther out in space, those most essential militarily and commercially.

The small size of the U.S. ASAT and its ability to be mounted on and fired from F-15 aircraft make its deployment very difficult to monitor. Consequently, the best way for both sides to be confident that innumerable ASATs of that type are not deployed is to ban it—and to do so before the U.S. ASAT test program advances to the point that either side becomes convinced that it is ready for deployment. Once that point is passed, an agreement to limit ASATs may no longer be negotiable and both sides will proceed full tilt to develop and deploy them. If this happens it will only aggravate crisis instability by adding to the incentive to shoot first, should nuclear war ever seem imminent.

Soviet interest in an agreement banning ASATs and thereby shoring up the ABM Treaty regime might well give the United States some potential bargaining leverage in seeking reductions in Soviet offensive forces, especially SS-18 ICBMs. To realize that potential, however, it is essential for the United States to slow the pace of its ASAT testing and very soon to halt it. Such a step would signal to Moscow that a deal is in the offing and would afford negotiators time to conclude it. This the Administration has so far flatly refused to do, but if it does not relent, Congress could step in and regulate ASAT testing, as it did last year. Failing that, the Soviet interest in Geneva will become largely propagandistic, while it accelerates its own research and development on space weaponry and deploys new offensive forces.

Propaganda is, in fact, the second Soviet motive in rejoining the talks. Having painted themselves into a corner by leaving the START and INF talks in December 1983, the

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Jim Ludtke, United States

Soviets found that their walkout was not making many converts in Europe. They sought a face-saving way back to the negotiating table, and the Reagan Administration gave them one by its public enthusiasm for the Strategic Defense Initiative, known throughout Europe as "Star Wars." Now the Soviets could present themselves as trying to keep the arms competition from spreading to space, a propaganda campaign that will play well in Europe. But such a campaign can be effective only when waged from a seat at the negotiating table.

The Soviets are not likely to remain at the table very long, however. They will show themselves to be very accommodating in the run up to the summit, but having played on Western hopes for an arms control agreement, they will be in a position to blame Washington and Star Wars if those hopes are dashed. Should they become convinced that the United States has no intention of limiting ASAT and preserving the ABM Treaty—and they will be watching U.S. ASAT tests as well as negotiating proposals for any signs of that intention—they are likely to turn Geneva into a propaganda platform and then stalk out of the talks once again. From Moscow's point of view, the summit is thus a fateful test of the president's seriousness about arms control.

THE PRESIDENT and most of his senior aides still insist that SDI is non-negotiable; it "is not an optional program, at the margin of the defense effort. It's central," Undersecretary of Defense Fred C. Iklé testified before a Senate hearing. "They are not things to be given up." In one respect he and other Star Wars proponents are right: SDI is no bargaining chip because it does not exist, and the Soviet Union knows it is unlikely ever to come into being.

ASAT is another matter, however. It does exist and is potentially a bargaining chip, but only if it is put on the table. Since the Administration still insists it will not do that, it presumably intends to achieve negotiating leverage with ASAT—much as it tried and failed with MX—by using it to threaten the Soviet Union, not by offering to trade it away.

ASAT is thus the critical link between SDI and results at Geneva. If testing is not curbed before deployment becomes a foregone conclusion, there will be no ASAT agreement at Geneva, opening the way to circumvention of the ABM Treaty by both superpowers. But that is not the only ASAT link between SDI and the Geneva talks.

Administration insistence on going ahead with SDI and holding open the ASAT loophole to do so is likely to preclude *any* arms control agreement at Geneva, not just one on ASATs. That is not so just because the Soviets say it is and insist that any agreement in START or INF is contingent on an agreement on space weapons. Nor is it so just because the joint communiqué announcing the new Geneva talks says as much: "The sides agree that the subject of the negotiations will be a complex of questions concerning space and nuclear arms, both strategic and intermediate range, with all questions considered *and resolved* in their interrelationship" (emphasis added). It is so ultimately because military security requires it: the best way for both sides to hedge against any advances in ballistic-missile defense is to keep open the possibility of adding to and improving their offensive capabilities. The need to hedge not only makes any negotiated reductions unlikely but may also jeopardize the prevailing limits achieved in SALT I and II.

What is worrisome is that attempts to develop defenses will stimulate efforts to enhance offenses as weapons laboratories try to outdo one another within, as well as between, the superpowers. That could mean a replay of MIRV, initially designed in U.S. laboratories working on countermeasures with which a U.S. ABM would have to contend, and then deployed in the face of mounting evidence that the Soviet ABM program was slowing down and that limits on ABM were about to be reached in SALT I. Soviet MIRVs followed a few years later. The net result was an increased incentive for both sides to preempt in a crisis—or crisis instability.

Confusion is endemic about exactly what the Administration wants SDI to accomplish; there are at least as many versions of SDI as there are government officials who comment on the program. The confusion is understandable in part because the president himself has offered only the vaguest intimation of what he wants: comprehensive defense of the United States against ballistic missiles using non-nuclear technology. And adding to the confusion is the fact that—with the possible exception of terminal defense of missile sites by use of nuclear devices—other forms of ballistic missile defense are little more than a gleam in a would-be inventor's eyes, and most experts doubt they will ever advance much beyond that stage.

IF THE SHAPE of SDI is still ill-defined, what is clear—to Moscow, if not to most Americans—is that Washington is less than candid when it says its present intent is to do no more than research. A presidential directive to the bureaucracy, NSDD 119, calls for "demonstrations" of ballistic-missile defense technology by 1989. "Demonstrations" are understood to mean tests. Unlike research and associated laboratory tests, which would not breach the ABM Treaty, most field tests would.

In written testimony to the Senate Armed Services Committee at the time of the Treaty's ratification, negotiator Gerard C. Smith made this distinction: "The obligation not to develop such systems, devices, or warheads would be applicable only to that stage of development which follows laboratory development and testing. The prohibitions on development contained in the ABM Treaty would start at that part of the development process where field testing is initiated on either a prototype or breadboard model." Article V of the treaty, Smith went on to say, "places no constraints on research and on those aspects of exploratory and advanced development which precede field testing. Engineering development would clearly be prohibited." The Soviets, who did not agree to this definition, have been saying in Geneva that the Treaty prohibits research at even earlier stages.

Yet Administration spokesmen insist that their demonstrations will not violate the Treaty. General James Abrahamson, who directs SDI for the Pentagon, told the House Armed Services Committee last February that "at some point" the United States "would have to depart from the Treaty," and acknowledged that this point would come "about the turn of the next decade." In the meantime, the Administration may try to exploit what it interprets as Treaty loopholes in order to conduct some field tests. One way it would do so has been mapped out by presidential science adviser George Keyworth II, who said in a February 1984 speech that SDI "would move towards a series of progressive demonstrations of evolving subsystems. Each of these demonstrations would test out a piece of militarily meaningful technology. These would be building blocks from which an eventual system could be designed but in and of themselves would not constitute a weapons system." By the Administration's tortuous interpretation these "building blocks" would not be ABM "components," as covered in the Treaty; but some in fact might be.

That is where ASAT comes in. Some ABM components could be tested in an "ASAT mode," thereby circumventing the Treaty. Keyworth has suggested as much: "It may not necessarily be the best way for the ASAT mission, but a geosynchronous anti-satellite capability is important to test the technology to destroy missiles in each of the three layers." Other ABM components which could be similarly tested in an ASAT guise include certain surveillance, acquisition, tracking, and kill assessment mechanisms, such as radars and other sensors, and some non-nuclear kill devices using kinetic energy or lasers. A specific example is "Talon Gold," a project which seeks to perfect a point-and-tracking mechanism conceivably useful for ASAT, whose primary purpose is for ABM target acquisition.

Instead of trying to erode the ABM Treaty regime, the United States has a negotiating option: one which would retain the possibility of SDI research, but not testing, if that is what the president wants. A quick deal could be blocked out at the summit on the model of the Vladivostok accord, with details to be filled in later at Geneva.

The terms of trade would call for U.S. renunciation of ASAT and SDI testing in return for some reductions in Soviet offensive forces, in particular the SS-18s, and a ban on any successor to the SS-18. Deeper cuts in SS-18s and SS-19s would doubtless require trading away all of MX and settling for low limits on Trident II. A ceiling on heavy bombers could also be established, perhaps permitting some modernization by both sides. And an INF agreement could be framed along the lines worked out informally in the walk in the woods: no Pershing II and some ground-launched cruise missile (GLCM) deployments in return for a modest cut in SS-20s and no modernization. The entire arrangement could be verified by national technical means.

SDI research, but not testing, could continue, since there is no way to monitor and verify a ban on it, and at least some research would be prudent to protect against the threat of breakout. If the president tried for something like that, he just might get it, and the benefits to U.S. security and Alliance cohesion would be well worth postponing the dream of deploying ballistic missile defenses. ☐

Star Wars and outer space law

In spite of the Reagan Administration's efforts to proceed with the Strategic Defense Initiative by drawing fine distinctions with treaty language, the program is on a collision course with the ABM, Outer Space, and Limited Test Ban Treaties.

by Daniel Arbess

ESTABLISHMENT of a legal regime governing outer space activities has been a basic object of political and military leaders, as well as of international lawyers, from the outset of the space age. As the Reagan Administration attempts in Geneva to promote its "defense-dominated" strategic relationship to the Soviet Union, it should be aware that a significant portion of this body of law is binding and relevant, both to the development of a "Star Wars" strategy, and to attempts to negotiate its implementation.

The 1967 Outer Space Treaty is central to the legal regime. Ratified by over 100 nations, including the United States, the Treaty establishes outer space as a zone to be treated differently by the international community with respect to international law than had previously been done with newly discovered territories or environments. Article II of the Treaty clearly defines outer space as "not subject to national appropriation by claim of sovereignty"—unlike the territories colonized by the Europeans from the sixteenth to nineteenth centuries.

The Treaty does, however, deal only inconclusively with the militarization of outer space. Although the preamble and the General Assembly resolutions leading up to it set out the lofty principle of use for peaceful purposes, Article IV.2 singles out only "the moon and other celestial bodies" for use "exclusively for peaceful purposes." The one concrete limitation on general military activities in outer space, found in Article IV.1, prohibits the emplacement in orbit of "objects carrying nuclear weapons or any other kinds of weapons of mass destruction."

Nonetheless, the Treaty stands as a widely supported affirmation of the basic principles of peaceful purposes and international cooperation in space which, in light of numerous recent General Assembly resolutions linking it with the militarization of outer space generally, might form the basis of a binding norm of international law. At the very least, therefore, if Reagan's Strategic Defense Initiative (SDI) is interpreted by the international community as involving nonpeaceful uses of outer space, it might violate the spirit of the Treaty.

This point is only reinforced by public statements and testimony of key Administration officials such as Robert S. Cooper, who told the House Armed Services Committee last year: "The policy for the first time recognizes the need to control space as a military environment."[1] And four eminent scientists have concluded that "given the intrinsic vulnerability of space-based systems, the domination of space by the U.S. would be a prerequisite to a reliable ballistic-missile defense of the entire nation."[2]

Furthermore, while the Treaty's prohibition against the deployment of "weapons of mass destruction" in outer space might not apply to the lasers and particle-beam weapons contemplated by SDI, it is far from established that the program will rely exclusively, or even primarily, on non-nuclear devices. "It's very difficult to do non-nuclear defensive weapons," a leading Star Wars scientist recently told *Newsweek*. "It may be that small nuclear explosives offer such an overwhelming advantage that they will have to be part of the system." If deployed in space, the nuclear-pumped X-ray laser, now regarded as one of the Administration's most promising prospects, would clearly contravene Article IV of the Treaty.

The X-ray laser would also run afoul of Article I of the Limited Test Ban Treaty, which prohibits nuclear tests "or any other nuclear explosion" in the atmosphere or outer space, since full operational confidence in the weapon's effectiveness would probably require such testing. If X-ray laser capabilities became part of an alliance-wide defensive deterrent, they would violate Article I of the Non-Proliferation Treaty as well, since that article prohibits the transfer "to any recipient whatsoever [of] nuclear weapons or other nuclear explosive devices or control over [them] directly or indirectly."

APART FROM the community standard of peaceful coexistence embodied in the Outer Space Treaty's provisions, the United States and the Soviet Union have created basic assumptions for their bilateral strategic relationship which remain clear and binding. And nowhere are these made more explicit than in the ABM Treaty—the sole bilateral agreement limiting the arsenals of both sides which is in full force and effect for unlimited duration.

The primary purpose of the ABM Treaty is to crystallize into law the condition of mutual assured destruction (MAD) by virtually eliminating defensive weaponry from both sides' arsenals, leaving each vulnerable to assured retaliation from the other. To this end, the Treaty flatly bans exactly what the president's Strategic Defense Initiative has been set up to create: a national, multi-layered, anti-ballistic-missile system for defense against incoming ballistic missiles. In fact, Article V prohibits not only deployment, but also development and testing, of "ABM systems or compo-

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nents which are sea-based, air-based, space-based, or mobile land-based."

Although its objective is clearly contrary to the spirit of the Treaty, the Reagan Administration has nonetheless steadfastly attempted to defend the legality of at least the initial stages of SDI. For the most part, its arguments have been based on a particularly narrow reading of the Treaty or some of its specific provisions.

For example, it has been suggested that development of laser and particle-beam technologies for the SDI program is not covered by the Treaty because they are not ABM "systems" designed within the Treaty definition "to counter strategic ballistic missiles . . . currently consisting of a) ABM interceptor missiles, which are . . . constructed and deployed for an ABM role, or a type tested in an ABM mode; b) ABM launchers, which are . . . constructed and deployed for launching ABM interceptor missiles; and c) ABM radars, which are . . . constructed and deployed for an ABM role, or of a type tested in an ABM mode."

This argument draws upon Agreed Statement D of the Treaty: "In order to insure fulfillment of the obligation not to deploy ABM systems and their components . . . the Parties agree that in the event ABM systems based on other physical principles and including components capable of substituting for ABM interceptor missiles, ABM launchers, or ABM radars are created in the future, specific limitations on such systems and their components would be subject to discussion."

But the Treaty's drafters seem to have been particularly conscious of the potential of later technological advances, having defined ABM systems in Article II in the most general terms as "systems designed to counter strategic ballistic missiles or their elements in flight trajectory." The subcategories listed above follow this general description and were merely examples of systems "currently" existing when the Treaty was negotiated.

A member of the U.S. ABM negotiating team, Raymond Garthoff, has stated that "the word 'currently' was deliberately inserted into a previously adopted text . . . in order to have the very effect of closing a loophole to the ban" on future ABM systems.[3] This interpretation is also clearly supported by the legislative history, including President Nixon's explanation in submitting the Treaty to the Senate for ratification.[4] Even the Administration's own Arms Control and Disarmament Agency seems to support this interpretation: "The ABM Treaty prohibition on development, testing and deployment of space-based ABM systems, or components for such systems, applies to directed energy technology . . . used for this purpose. Thus, when such directed energy programs enter the field testing phase they become constrained by these ABM Treaty obligations."[5]

The claim most often advanced for the legality of SDI, and the one officially put forward by the Administration at the Geneva negotiations, as well as to U.S. allies, relies on the distinction between "development" of specified ABM systems or components, which is prohibited, and "research," which is not. Neither term is defined in the Treaty, but the meaning of "development" was discussed during the negotiations. In the end, the distinction was understood by the United States to have been a functional one: activities which could not be verified by national technical means would be permitted. A written submission by the executive branch to the Senate Armed Services Committee, in response to a question by Senator Henry Jackson, indicates that virtually any activity beyond the laboratory development and testing stage to the field testing stage would be prohibited.[6] Under this interpretation, repeatedly endorsed by the Arms Control and Disarmament Agency, a number of tests and demonstrations scheduled to take place within this decade would be in violation of the treaty.[7]

Administration officials have also narrowly interpreted the prohibition on ABM "components," defined in Article II of the treaty as interceptor missiles, launchers, and radars, and referred to in Agreed Statement D as "components capable of substituting for" the foregoing. They argue that a device would be prohibited only if it could substitute on a "stand alone" basis. This argument relies on the claim that because the technology for the planned system will be so different from that involved in the components originally singled out in the Treaty, an SDI system would consist of elements which could not singly, or in combination, serve every function of those components in the older technology.

McGeorge Bundy, George Kennan, Robert McNamara, and Gerard Smith have dismissed this argument, stating: "We find it hard to see how a boost-phase detection system could be anything but space-based, and we are not impressed by the Administration's claim that such a system is not sufficiently significant to be called a 'component.'[8] A report on Soviet and U.S. programs and the ABM Treaty similarly concludes that such a narrow interpretation "ignores the history of the Treaty negotiations, which clearly suggest that ABM sensors do not have to perform the full spectrum of ABM battle management functions in order to be subject to the limitations of the Treaty."[9]

It seems clear that the very objective of Reagan's Star Wars contravenes the object and purpose of the ABM Treaty, which states in Article I that "Each party undertakes to limit anti-ballistic missile systems," as well as the underlying assumption, stated clearly in the Preamble, that the U.S.-Soviet strategic relationship would be most stable, and the prospects for offensive arms control best, if defenses were limited.

Indeed, the program might well threaten the entire legal regime whose fundamental premise is international cooperation in the use of space for peaceful purposes. Against this background, arguments about the exact technical limits on testing and development, the fine line between "research" and "development," or between "component" or "adjunct," are of little consequence; SDI will inevitably violate the Treaty outright.

The Administration itself seems to acknowledge this. The Arms Control Impact Statement for 1985 recognizes that "the Strategic Defense Initiative . . . is a very long term effort" which "for the near future . . . will consist of research and development totally consistent with the ABM Treaty."[10] Beyond "the near future," however, ballistic missile defense potential envisaged by SDI "could eventually create a conflict with the obligations assumed by the U.S. under the provisions of the ABM Treaty."[11]

Star Wars supporters have suggested modifying or amending the Treaty to eliminate this conflict. But, as Gerard Smith told Congress last year, amending the Treaty to permit the very nationwide defenses it was designed to prohibit "would be like amending the Volstead Act [which implemented the Prohibition Amendment] to permit the sale of alcohol."[12] The reality, according to Smith, is that "We are already in anticipatory breach of contract."[13]

If the Administration wishes to alter the basic, agreed upon rules of the strategic game so drastically, it cannot do so lawfully on its own. The obligations and expectations for the negotiation of arms control agreements relating to space weapons established in the SALT-ABM process and other areas of the legal regime, may only be changed bilaterally or multilaterally, by agreement, and through the same diplomatic channels through which they were originally created.

In the meantime, those assumptions remain operational and, according to Article 26 of the Vienna Convention on the Law of Treaties, must be performed by the parties in good faith. Similarly, the U.N. Charter requires that states shall seek "to establish conditions under which justice and respect for the obligations arising from treaties . . . can be maintained" by carrying out "in good faith the obligations assumed by them."

ALL OF WHICH brings us back to the Geneva negotiations. There is now clear evidence that SDI is expected to be far more fundamental to U.S. defense policy than any previous "bargaining chips" and will proceed whether or not the goal of "rendering nuclear weapons obsolete" is considered an attainable one.

Last February, for example, Fred Iklé, undersecretary of defense for policy, stated that SDI is "not an optional program at the margin of the defense effort. It's central." In January, Secretary of Defense Weinberger foreshadowed the implications of Iklé's statement for the U.S. bargaining position: "I am ruling out the possibility of giving up a strategic defense either in the research stage, or if it becomes feasible, in the deployment stage." Referring to the U.S. agreement of a few days earlier to discuss strategic defenses in the Geneva negotiations, Weinberger said he interpreted it as meaning that the United States would try "to bring the Soviets around to the idea that defense is a much better way of deterrence than offense."

As if to underscore the nonnegotiability of Star Wars, an article by chief U.S. negotiator Max Kampelman appeared in the January 27 *New York Times Magazine*, on the eve of the first Geneva session. In it, he expressed doubt about the continued validity and utility of the prevailing arms control regime, citing Star Wars as the only alternative. Even more to the point was Iklé's comment in a recent issue of *Foreign Affairs*: "Should the Soviet leaders choose to maintain their doomsday capability at any price, the prospects for arms control would be bleak indeed."[14]

Taken together, these statements raise serious questions about the United States' good faith performance of and

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respect for existing obligations. But perhaps of even greater consequence, they also strongly suggest that the threat to violate existing agreements lies at the basis of the Administration's initial position in the negotiations. By insisting that Star Wars is nonnegotiable, while pursuing programs that would clearly violate the Treaty as early as 1989, Washington is presenting a clear ultimatum to the Soviets: either agree to amend the Treaty to allow SDI to proceed with development and testing after 1988, and allow currently prohibited joint research and development with the allies as well as deployment of anti-tactical missiles in Europe, or the United States will abrogate the Treaty. Clearly such tactics throw into doubt U.S. compliance with the basic obligation "to pursue negotiations in good faith," codified in the Non-Proliferation Treaty.

As the experience of the latest NPT review conference illustrates, this precedent—threatening abrogation of one set of obligations to coerce the other side to move to a different set of rules and expectations or to make other concessions—seems likely to be a costly one for the United States. At the very least, the Administration's approach could erode international confidence in the United States to maintain treaty promises, except when convenient. And this in itself might afford increased incentive to pull out of the NPT to member nations already impatient with the superpowers' lack of progress in discharging their obligations. In a larger sense, widespread loss of confidence in the Administration's commitment to arms control obligations might well result in cynicism and loss of respect for the fragile authority of international law in general.

IF THE REAGAN Administration is sincere in its professed desire to establish a new international regime based on missile defenses and offensive arms reductions, it should offer a winding down transition, during which those weapons most threatening to the other side would be withdrawn first, concurrent with the development of defenses to build confidence in survivability without threat. But if the Administration was sincere, why did it turn down the Soviet "freeze while we negotiate" proposal?

A freeze on development and deployment of the weapons systems which pose the greatest threat to the Soviet Union—super-accurate, hard-target-kill Pershing II, Trident D5, MX, and cruise missiles—would be a perfect way of allaying Soviet concerns that the Reagan "defensive transition" is a thinly veiled attempt to achieve a first-strike capability while retaining an adequate defense against whatever retaliation the opponent could then mount. The continued deployment of air-breathing cruise missiles which would circumvent any envisaged defensive technology, for example, appears to contradict completely the lofty vision of "mutual assured security" which Reagan has held out before world public opinion.

Instead, as a demonstration of good faith and sensitivity to "mutual" security concerns, why not give the Soviets incentive to join in a transition to a defense-dominated relationship by scrapping all offensive weapons which threaten Soviet forces, and inviting them to reciprocate? Why not deliver on promises to share defensive technology with the Soviets, or at least turn over the technological challenge and know-how to a neutral agency, perhaps the United Nations? Perhaps if the superpowers could agree on steps to decrease substantially the threat each poses to the other, both would be secure enough in the survivability of their own retaliatory forces not to be concerned with defensive technology.

The current Administration would probably find these suggestions implausible, in which case there would seem to be adequate reason to question the "good faith" of those who are bargaining with the Soviets in Geneva. Indeed, there is another possible objective behind the president's Strategic Defense Initiative. As Secretary of Defense Weinberger told the Senate Armed Services Committee last year: "If we can get a system which is effective and which we know can render their weapons impotent, we could be back in a situation we were in, for example, when we were the only nation with a nuclear weapon."

If a return to superiority or monopoly is what lies behind SDI, we should not expect the Soviet Union to agree readily to any arms control whatever, much less to contemplate a fundamental redefinition of the strategic relationship. Nor should the United States consider itself persecuted when it is alienated and condemned within the international community—even by some of its own allies—for ignoring binding legal obligations.

If genuinely defensive motivations reign, let them be given vitality by negotiating first, under the existing regime, on the reduction of the most threatening and vulnerable offensive systems on both sides. Only when the parties have had some success within the current framework will it be safe to consider abandoning it in favor of another legal regime. ☐

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1. House Armed Services Committee, 98th Congress, 2d sess., 1984.
2. Hans Bethe and others, "Space-Based Ballistic Missile Defense," *Scientific American* (October 1984), p. 43.
3. *International Security*, 1 (Summer 1977), pp. 107–09.
4. "Communication from the President of the United States, Transmitting Copies of the Treaty on the Limitation of Anti-Ballistic Missile Systems and the Interim Agreement on Certain Measures with Respect to the Limitation of Strategic Arms," 92nd Congress, 2d sess., House Document No. 311 (1972), pp. 9–10.
5. Fiscal Year 1985 Arms Control Impact Statements, 98th Congress, 2d sess. (1984), p. 251.
6. *Military Implications of the Treaty on the Limitations of Anti-Ballistic Missile Systems and the Interim Agreement on Limitation of Strategic Offensive Arms*,Hearings before Senate Arms Services Committee, 92d Congress, 2d sess. (1972), p. 377.
7. Thomas K. Longstreth, John E. Pike, "U.S.-Soviet Programs Threaten ABM Treaty," *Bulletin* (April 1985), pp. 11–15.
8. McGeorge Bundy and others, "The President's Choice: Star Wars or Arms Control," *Foreign Affairs* (Winter 1985), p. 274.
9. Thomas K. Longstreth, John E. Pike, John B. Rhinelander, "The Impact of U.S. and Soviet Ballistic Missile Defense Programs on the ABM Treaty," A Report of the National Campaign to Save the ABM Treaty (March 1985).
10. 1985 Arms Control Impact Statement, op. cit., p. 255.
11. Ibid., p. 57.
12. Gerard C. Smith, Hearings, Senate Committee on Foreign Relations, 98th Congress, 2d sess., p. 57.
13. *Washington Post*, June 20, 1984, p. A12.
14. Fred C. Iklé, "Nuclear Strategy: Can There Be a Happy Ending?" *Foreign Affairs*, 63 (1985), p. 825.

SDI: the stability question

Most discussions of strategic defenses have neglected the impact such systems would have on the stability of superpower relations.

by Gerald E. Marsh

THE ATTRACTIVENESS of a strategic nuclear policy based on defense rather than offense rests on the perception that such a policy, in addition to gaining the "moral high ground," would increase stability and could ultimately result in arms reductions.

The issue of strategic stability between the United States and the Soviet Union is crucial. President Reagan and members of his Administration have stated repeatedly that the ultimate goal of the Strategic Defense Initiative (SDI) is to protect the populations and industrial centers of the entire United States and its allies. The implications of SDI for strategic stability would not be the same if its purpose were, for example, to protect missile silos or command, control, and communications assets. The distinction is important since the goals of SDI seem to change with time, and various members of the Administration have interpreted the policy differently.

It is important to differentiate from the beginning between crisis and arms-race stability: A strategic balance which enhances the attractiveness of preemptive strikes by either side is one that exhibits crisis instability. Arms-race instability, on the other hand, occurs when production and deployment of additional weapons would be perceived by either side as being to the producer's advantage, thereby precipitating an arms race. Either of these instabilities may be present at different levels of ABM-system effectiveness.

The two criteria enunciated by Paul Nitze in his Philadelphia speech of February 20, 1985—that an ABM system must be cost effective at the margin (that is, that it is cheaper to add to the defensive system than it is for the other side to add to its offensive weapons) and survivable—have been incorporated into current Administration policy as reflected in National Security Decision Directive 172, the essence of which is contained in U.S. Department of State Special Report No. 129, dated June 1985. This directive also addresses British Prime Minister Margaret Thatcher's four points which constitute the basis for British support of SDI.

The Nitze criteria are necessary and important requirements for any defensive system, but they are not sufficient to guarantee strategic stability. The Administration contends that the survivability criterion addresses the concern that deployment of a defensive system could degrade crisis stability. But lack of survivability is not the only incentive for a preemptive attack, while the criterion of cost effectiveness at the margin could have some surprising consequences with regard to stability.

THE REMAINDER of this article will consider three cases of SDI system capability and the consequences for each of imposing Nitze's criterion of cost effectiveness at the margin. No attempt will be made to quantify defensive-system capability in terms of the number or percentage of warheads that penetrate the defense (leakage rate). Although this could be done, any specific numbers would require extensive justification and would add little to the discussion. Nitze's survivability criterion will be assumed for the purpose of most of the analysis here, although the proposition is itself dubious. Survivability of the defensive system must not be confused with survivability of offensive forces. (It should be noted that the criterion of cost effectiveness at the margin would logically lead to a highly capable ABM system. On the other hand, marginal cost effectiveness might hold only over a limited range of defensive capability, depending on the mix of defensive technologies used.)

The first case to consider is one in which an ABM system having very limited capability is deployed by one side, while its nuclear offensive forces are maintained at their current levels. Limited capability can be defined as adequate to introduce an element of uncertainty into the other side's offensive ability to destroy important targets—in other words, it degrades the opponent's force effectiveness.

If Nitze's cost effectiveness criterion were met by this kind of ABM system, strategic "equilibrium" could be reestablished only temporarily if the other side increased its offensive forces. Since that would have to be done at greater marginal cost, it is a race that the offensive side could not ultimately maintain. This arms race instability would continue unless the offensive side accepted a degradation in force effectiveness or the defensive side allowed the balance to be reestablished. (Without the criterion of cost effectiveness at the margin, the strategic equilibrium would be reestablished when an opponent was convinced that force effectiveness had been restored. But under current Administration guidelines, strategic defenses would not be built if this criterion were not met.)

The arms race instability exhibited by a minimally effective ABM system might be avoided if the side deploying it simultaneously reduced its offensive forces so that the computer-simulated war games used by military analysts would indicate the same outcome of a nuclear exchange. If the system were not marginally cost effective, such reductions might insure arms race stability, while if the system

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did satisfy the criterion there would be a built-in hedge against an opponent's increasing its forces. Such offensive reductions—coincident with defensive-system deployment—could be made unilaterally and could allow reliance on a mix of offense and defense.

Given the deployment of a minimally capable ABM system that satisfies the criterion of marginal cost effectiveness, an opponent might choose to deploy its own defensive system, thereby degrading force effectiveness for both sides. This possibility is a stated Administration objective. Such symmetrical deployment of defenses would significantly constrain targeting policy and might in fact enhance deterrence since particular military objectives could not be attained with a high degree of confidence, thereby reducing the incentive for preemption. It remains to be shown, however, that cost effectiveness at the margin can be achieved for an ABM system with space-based components.

The case of a moderately effective ABM system—one for which an increase in the number of offensive warheads could not adequately reduce attack uncertainties—displays a different type of instability. The principal concern of an opponent would no longer be that such a system would reduce its force effectiveness, but rather that the defensive system would be highly capable against a retaliatory second strike. An opponent would perceive the deployment of a moderately capable ABM system not as a defensive move, but rather as a first-strike threat. This would be true even if both sides made such deployments. A moderately effective ABM system exhibits crisis instability; both sides have an incentive to consider preemptive strategies. Nitze's criterion of marginal cost effectiveness here insures arms-race stability, but not crisis stability. This will remain true so long as offensive forces, including command, control, and communications systems, are not sufficiently survivable, although there may well be considerable uncertainty about an attacker's ability to achieve specific attack objectives. Policy statements to the effect that deployment is not meant to achieve a first-strike capability would have little impact on an opponent since judgments would be made on the basis of perceived capability rather than stated intent.

The case of a highly effective ABM system is somewhat more complicated and requires not only an understanding of fundamental technological uncertainties and limitations, but also a realistic assessment of defensive system survivability. Neither opponent would be likely to allow the other to unilaterally obtain such a system, since to do so would constitute acquiescence to nuclear dominance.

Call for Proposals

The Three Mile Island Public Health Fund will commission consultants to develop an emergency plan for the TMI complex. The plan will consider source terms; health risk; evacuation decisions; sheltering; planning of medical registry and services; transportation; essential services; veterinary data network; behavior under stress; and credibility of information sources. For information call or write Jonathan Berger, 1622 Locust Street, Philadelphia, Pennsylvania 19103; telephone (215) 875-3026. The deadline for proposals is Nov. 30, 1985.

If both sides have defensive systems with nonsurvivable components, the advantage would go to the side that initiates an exchange—again a situation of crisis instability. On the other hand, a highly effective and survivable ABM system that is cost effective at the margin would appear to be stable. But even if such systems were technologically possible, the transition to a defense-dominated world would require a level of international cooperation between adversaries that transcends historical precedent.

THE TECHNOLOGICAL reality, however, is that system concepts based on current and projected technologies are not survivable, and achieving an ABM capability that would be even moderately effective against an unconstrained, responsive offensive threat is highly unlikely. While some components of SDI, viewed in isolation, show much technological potential and may indeed have future military applications, they show little promise of being able to constitute the building blocks of a system capable of fulfilling President Reagan's goal of defending the entire United States and its allies.

Technological realities, however, do not prevent SDI from having significant immediate consequences. These result primarily from the perception, by both the Soviet Union and some in Western Europe, that SDI reflects future, if not current, U.S. policy intentions—particularly with regard to the ABM Treaty. Because adherence to it is generally regarded as a precondition for continued reciprocal acceptance of the SALT force-level limitations, the ABM Treaty is one of the key pillars of current arms control agreements. A declared U.S. policy to evolve toward a defense-dominated strategy will have a significant impact on NATO and on Soviet military planning regardless of its ultimate success.

But success is relative. A Soviet ABM system of limited capability against the United States may be quite capable of severely degrading British and French strategic deterrents. Both these countries have expressed concern over Soviet ABM deployments and have taken steps to improve their capabilities to penetrate existing and anticipated Soviet defenses. Given French President François Mitterand's refusal to participate in SDI and his establishment of a French "Eureka" program, the depth of both the English and German commitments to SDI becomes questionable.

Until the issues surrounding arms-race and, particularly, crisis stability are resolved—and it is not clear that this is possible—there is no point in pursuing the development of technological components for SDI beyond a minimal, clearly defined, and multilaterally acceptable research program. The Nitze criteria, as reflected in current Administration SDI policy, although not sufficient to guarantee strategic stability, are important steps in the right direction. Ultimately, however, the interests of the United States might best be served by strengthening the existing arms control regime. ☐

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Nuclear crisis and human frailty

While costly efforts are underway to offset physical threats to the technical management of future nuclear crises, the human component is the least analyzed or even acknowledged.

by Lincoln P. Bloomfield

HOWEVER THE FEVER chart of superpower relations may fluctuate in the years ahead, the only prudent bet is for a future punctuated by crises through which both White House and Kremlin must somehow pick their way without reaching in desperation for genocidal weapons —a possibility, however remote, in major international crises in the nuclear age.

Whether Washington or Moscow has ever seriously contemplated such a portentous step is debatable. But the weight of the evidence so far has supported the conclusion drawn by McGeorge Bundy, President Kennedy's national security adviser, that "in the real world of real political leaders—whether here or in the Soviet Union—a decision that would bring one hydrogen bomb on one city of one's country would be recognized in advance as a catastrophic blunder; ten bombs on ten cities would be a disaster beyond history."[1]

Yet common sense argues that so long as there are nuclear weapons—and crises—the paramount goal of national security policy must be stability in crisis situations, a point stressed by the Scowcroft Commission when it argued that "the first [arms control] goal should be to ensure that the nature of the forces on each side does not provide a military incentive to strike first with nuclear weapons in a crisis." Such control requires that in tense circumstances the U.S. president be able to communicate reliably with nuclear forces worldwide while receiving timely intelligence, using the vast collection of procedures, people, equipment, electronics, and information summed up in the jargon as "C^3I."

So far the nuclear superpowers have been able to ride out even serious crises without great pressure to use nuclear weapons. There has always been time to find out what was happening, and to conduct diplomacy aimed at cooling things down. But three developments threaten to undermine future crisis stability:

- The accuracy of nuclear warheads has been improved tremendously.
- Such weapons are targeted on retaliatory forces and deployed ever closer to both sides' command centers, thus steadily shrinking warning time of potential attack from days to minutes.
- The information flow essential to decisions has vastly multiplied, while the vulnerability of telephone lines, switching centers, radar antennas, and presidents themselves has increased.

While enormously costly efforts are underway to offset physical threats to the technical management of future nuclear crises, the vital human component of crisis management is the least analyzed or even acknowledged. Yet unless the management of intense crises is to be turned over to computers—creating another set of problems—fateful decisions will be made under conditions of unprecedented stress by fallible, failure-prone human beings. Standard military training seeks to drill procedures into human consciousness until they are ingrained and can be relied on under pressure. But the plans for top-level crisis management imply unrealistic demands on humans no less than on complex machines.

The information load in a major foreign policy crisis places a great burden on the human mind. Diplomatic cable traffic and military intelligence that would normally stop at lower levels is redirected to top decision-makers. Leaders suddenly confront complex choices while being constantly interrupted by urgent messages, and information overload is exacerbated by high-speed electronic information processing.

Decision-makers must also scan the flow of events for subtle, symbolic moves by the other side. A shift of certain military units may signal offensive intentions—or may be a reassurance that nothing is planned. Words left out of a diplomatic message or use of private channels may or may not mean the other side intends to change course. The Kremlin sometimes prefers indirect or "deniable" communication in a crisis, as in the astonishing use of U.S. journalist John Scali at the height of the Cuban missile crisis, or the signals issued when Moscow was ready to wind down the Korean war but did not want to say so publicly.[2] Such signals are subject to serious misinterpretation or may even be totally missed.

At such times a generous amount of *mis*information is also present in the torrent of unconfirmed but worrisome intelligence reports which flows in faster than it can be absorbed, let alone investigated. Two egregious examples were the mistaken sightings of Soviet submarines and overflying aircraft during the dual crises of Suez and Hungary in 1956, and an ambiguous buildup of Soviet forces in the TransCaucasus Military District after the invasion of Afghanistan in

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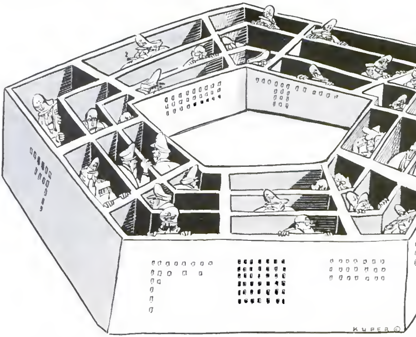

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late 1979, suggesting an imminent invasion of Iran. In these and other cases "prudent" assessments turned out to be incorrect. In a full-blown nuclear crisis even normal precautionary responses could be catastrophically wrong.

SINCE THE 1940s, the design of U.S. nuclear decision-making has walked the line between greater centralization, so the president can retain tight control over any use of nuclear weapons, and *de*centralization, so that in the event of an enemy attack the system is not paralyzed by a communications breakdown or the president's unavailability. While the authority to order use of nuclear weapons belongs ultimately to the president, such authority descends to the secretary of defense and then to the deputy secretary of defense, secretaries of the Army, Navy and Air Force, and so on, all constituting the "National Command Authorities" (NCA).[3]

The president receives information from major warning systems and transmits orders to the Strategic Air Command (SAC), Readiness Command, Central Command, and theater commands. These orders go from the National Military Command Center (NMCC)—the war-room in the Pentagon—via the secretary of defense, through the chairman of the Joint Chiefs of Staff. In addition, since the Kennedy Administration, the White House Situation Room is equipped to receive all important traffic and can communicate directly to virtually all points.

The United States has made substantial efforts over the years to establish checks and balances in the nuclear decision-making system. The SAC commander may order the deployment of his B-52 bomber force on receipt of a credible warning from North American Aerospace Defense Command (NORAD) but "positive launch control" keeps planes in airborne holding positions until "Go" codes are received. Presumably the same is true of the submarine fleet.[4] A crucial restraint for all systems except submarines is the array of computer-constructed electronic key codes, coding devices, and interlocks—"Permissive Action Links" (PALs)—whose unlocking enables unit commanders to use the proper numerical firing code.[5]

The National Military Command System (NMCS) provides alternate command posts for the president and defense chiefs, plus SAC's always-airborne command post, code-named "Looking Glass." At some point in a potential nuclear crisis the president would be evacuated by helicopter from the White House to "Kneecap"—the National Emergency Airborne Command Post (NEACP)—from which he would direct countermoves through telephone and teletype circuits and all-frequency radio communication linking him to the specified and unified commands and services plus land- and sea-based terminals.

As of the early 1980s, 94 percent of the U.S. government's most critical communications circuits were leased from commercial carriers, principally the Bell system. C^3 upgrading aims at hardening landlines and satellite ground stations, as well as establishing Extremely Low Frequency for

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improved conversations with submerged submarines, Very Low Frequency Reception for bombers and, later, laser communication.

Antisatellite weaponry poses an obvious threat to C^3. Today the ASATs on both sides can attack only reconnaissance and electronic intelligence satellites, while early-warning and communications satellites in geosynchronous orbits are still unreachable. Decreasing warning time prompted development of NAVSTAR satellites whose output would go directly to SAC, NORAD, and the NMCC.

U.S. reluctance to ban ASAT testing is based in part on concern that Soviet surveillance satellites could one day precisely target U.S. ships and submarines. But the U.S. military C^3 system is even more dependent on satellites than is the Soviet system. In an intense crisis during a period of all-out ASAT competition, a reported satellite failure, accidental or not, might be taken by either side as a signal of impending attack. In addition, unhampered satellite observation could be crucial not just for military purposes, but for arms control and ceasefire purposes, for example, counting submarines to reassure both sides that an attack was not imminent.

The Washington-Moscow hotline established in 1963 could be vital in enabling civilian leaders to collaborate to avoid or end a nuclear exchange. It has reportedly been used on tense occasions such as the June 1967 Middle East war, the 1971 Indo-Pakistan war, the U.S.-Soviet confrontation that suddenly erupted during the 1973 Middle East war, and several times since. Even in July 1984, at a low point in relations, U.S. and Soviet leaders agreed to upgrade the hotline to transmit 192 words per minute, rather than 64, as well as high-resolution photos and graphics. A year later it was agreed to use the hotline for exchanging information about possible nuclear terrorism.[6]

It makes excellent sense to strengthen C^3 to enable the nation's civilian leaders to maintain tight control over their nuclear forces in the face of ambiguous, worrisome indicators of possible attack—both to deter and to negotiate an end to the crisis—although some analysts consider the effort not only futile, but likely to strengthen the trend toward automated annihilation. One argues that a moderately small Soviet attack (50–100 warheads) sufficient to shatter linkages with the strategic forces fits in with Soviet military doctrine, and concludes that "there can be no possibility of controlling a nuclear war."[7] Another favors improvements in C^3 but worries that with short warning times, decapitation doctrines, and possible delegation of release authority down the line as the alert level rises, more C^3 may bring less rather than more stability to crisis management by making political direction of a nuclear war virtually impossible.[8]

Possible confirmation of that concern comes from the memoirs of a recent White House official responsible for presidential nuclear strike orders and emergency evacuation sites. His conclusion was that "the system is a shambles":

> The system is brilliantly conceived and executed from the detection networks around the world to the high-IQ computers at NORAD. But then, when it gets to the White House, it's all mashed potatoes. . . . If the crunch came, nothing would happen. . . . There isn't a hope in hell that [the president] is going to get on a conference call with his advisers before the mushroom clouds start forming. *Not once has the human failure factor been taken into account* (emphasis added).[9]

A system designed for worst cases must also stand the test of the human or "foul-up" factor. In complex systems, unforeseen malfunctions can generate a chain reaction of unplanned events, which at worst may combine synergistically to produce catastrophic system failure. Examples range from Three Mile Island and Bhopal to potential military disasters on both sides from faulty microchips, incorrect alert tapes, navigational errors, and wayward missile trajectories.

The favorite historical analogy for a war no one wants is the chain of events following the assassination in 1914 of Archduke Franz Ferdinand by Serbian nationalists, leading to the bloodbath of World War I. Reluctant guarantees, reciprocal mobilization, the final ultimatum—all were avoidable steps in a slide toward a disastrous war from what today would be called a local conflict. The degree to which that sequence was devoid of rational calculations is caught in the question German Chancellor von Bülow asked his successor: "How did it all happen?" And in the answer: "Ah, if we only knew."

What particularly links World War I to the contemporary situation is the primacy in both instances of offensive military doctrines and strategies. According to historian Barbara Tuchman, the very nature of Germany's Schlieffen Plan pressured civilian leaders to make hasty and aggressive decisions: "General Staffs, goaded by their relentless timetables, were pounding the table for the signal to move lest their opponents gain an hour's head start. Appalled upon the brink, the chiefs of state who would be ultimately responsible for their country's fate attempted to back away but the pull of military schedules dragged them forward."[10]

HISTORIANS HAVE amply demonstrated that foreign policy decision-making under intense strain, as in the case of World War I, can produce distorted results. Other well-known examples are the American leaders who blocked out signals of impending attacks on Pearl Harbor in 1941 and South Korea in 1950, and Josef Stalin's stubborn denial of mounting evidence of a probable Nazi attack.

There is a sense in which crises can be beneficial. Social scientists have long observed that mild stress facilitates decision-making and often improves its quality; the Kennedy team's deliberations in the Cuban missile crisis are often cited as a model of rationality under pressure.

At the same time, virtually all researchers of stress observe an inverted U-shaped curve along which individuals reach a crossover point leading to rapid decline in performance. Studies of stress catalogue a numbing litany of individual and "committee" malfunctions along with coping mechanisms that distort objective reality:[11]

- increased rigidity leading to intolerance of ambiguity, fixation on one alternative, inflexible operating plans, and incomplete consideration of risks and contingency plans;
- defensive and avoidance mechanisms such as bolstering, denial, procrastination, and withdrawal; or, alternatively, belligerence and illusions of invulnerability;
- collapsed time perspective, neglect of future consequences, and declining sense of responsibility for outcomes;
- unquestioned belief in the group's moral superiority, and tendency to consult only with those in agreement, while personal doubts are suppressed;
- stereotyping of opponents, resulting in self-fulfilling prophesies, or worst-case analysis of opponents' behavior, especially if precrisis analysis has been overly optimistic;
- confusion and improper information handling, resulting from information overload;
- failure to implement decisions due to their complexity;
- reliance on inappropriate historical analogies and lessons; and
- panic and demoralization.

A survey of people in crisis finds overwhelming evidence that decision-makers "fit incoming information into their existing theories and images" and "tend to perceive what they expect."[12] The more intense the crisis, the more the individual hunkers down into ingrained patterns of behavior and belief. One consequence of this rigidity is chronic underestimation of the "degree to which the other side's policies are the product of internal bargaining, internal misunderstandings, or subordinates not following instructions."[13] A review of 24 political-military crisis simulations revealed a "severe inability by the United States to understand the expressed intentions of another state."[14]

I have emphasized the threat to rational decision-making of excessively short decision times; students of the Cuban missile crisis believe that if the decision had been forced within 48 hours instead of a week, it would have taken the form of a military attack on Cuba, with incalculable consequences.[15] But another concern is the behavior of individuals *too long* under stress, who are literally exhausted. The fatigue factor is one of the most important, yet least understood, aspects of crisis decision-making. Veterans of foreign policy crises sometimes boast of having gone without sleep for days of unremitting tension, punctuated only by snatched catnaps and inordinate amounts of caffeine. Experimental evidence demonstrates, however, "that human beings cannot tolerate long periods of sleep deprivation without experincing significant behavioral modification."[16]

Researchers of disaster behavior also report that the greater the perceived danger, the smaller the percentage of individuals "who make full use of the available information and choose an effective course of action." Their ironic conclusion: "When people are warned about incoming danger that will materialize within a very short time interval, their fear mounts to such a high level and they act so inappropriately that they would be better off with no warning at all."[17]

ALL THE EVIDENCE about human impairments under stress, combined with available data on weaponry and strategy, command, and control, lead inevitably to the conclusion that the nuclear crisis decision-making system cannot be expected to work as planned without major alterations. In concrete terms, this calls for steps to return the weapons, the strategies, and the deployments to the earlier relative stability that gave civilian decision-makers confidence that they could ride out crises, wait for confirmation or reassurance, and meanwhile conduct deescalatory diplomacy.

In addition to standard questions about defense and deterrence, two questions should constitute the acid test for policy: "Does this weapon/policy/strategy/procedure give civilian leadership time to be clear about what is happening in a nuclear crisis before making fateful decisions?" And: "Are adequate precautions being taken to insure maximum rationality on the part of highly stressed decisionmakers?"

Any plans for "decapitation" of the other side's civilian decision-making centers should be abandoned, and agreements urgently negotiated to reduce or eliminate systems that put the other side on a "hair-trigger," whether Soviet offshore submarine patrols and depressed trajectory missiles that threaten Washington, or intermediate-range ballistic missiles in Western Europe that can destroy Soviet command centers in minutes.

To meet the same test, strategic doctrines should minimize reliance on early nuclear use under any contingency except confirmed direct nuclear attack. By diplomacy and by example, steps should be accelerated to substitute dispersed, mobile Midgetman types of single-warhead missiles for "all-eggs-in-one-basket" MIRVed systems such as Soviet SS-18s and the U.S. MX, while reinforcing agreements not to hide strategic delivery systems from external verification.

In theory, an effective strategic weapons defense could permit the nuclear superpowers to conduct their adversarial relationship without mutual survival being put at risk with each major crisis; a defensive world should be at least as crisis-stable as the retaliation-dominated one we have learned to live with. But paradoxically, the *process* of seeking safety through antimissile defenses could produce the most unstable world of all. The most perilous moment in the U.S.-Soviet relationship could occur during a crisis at a time when one superpower seemed to be beating the other to a relatively effective missile defense. Defense Secretary Caspar Weinberger unwittingly confirmed the point when in December 1983 he called Soviet development of an effective ballistic-missile defense "one of the most frightening prospects I could imagine." To preserve stability, therefore, antimissile defenses should be developed only through a parallel or joint, rather than unilateral, effort.

In addition, agreements to ban or limit antisatellite weaponry testing and deployment in outer space could reduce the chance that a technological malfunction will convey a misleading indicator. Rules for behavior in outer space must also be updated.

The hotline should be supplemented with additional means for avoiding misunderstandings through exchange of data and reassurances among all nuclear powers. Many useful proposals are available for such sensible measures as joint "crisis centers," multilateral antiterrorism, unmanned sensors, and better civilian control.[18]

Superpower discussions aimed at crisis-avoidance should become routine rather than sporadic. Great power "spheres of influence" once helped avoid war, but today they are unfashionably imperialistic. U.S. and Soviet leaders could, however, discuss what might be called "spheres of abstention," identifying regional conflicts which it is in the interest of both to insulate from external meddling, possibly under a U.N. or other multilateral umbrella.

Psychologists have long urged monitoring for irrational behavior at the top. Such recommendations sometimes call for obtrusive or insulting procedures, and those in high office seldom admit the possibility of irrationality. But psychiatrists do monitor for pathological effects of fatigue and excess stress among pilots, submariners, and missile officers; it is surely as important to do the same at the apex of the decision-making pyramid. An inner circle "damage control officer" should watch for symptoms of irrational behavior and alert officials accordingly.

Likewise, if junior officers are required, as a safeguard against individual pathology, to share the responsibility for firing nuclear weapons, it is far more important to do so where the stakes are infinitely greater. An additional safeguard would be a "two-key" procedure for the president and his designated surrogates in the National Command Authorities chain.

Finally, the most costly impairments of foreign policy decision-making arise from mutual misperceptions. The profound cultural gulf between Soviets and Americans warrants building into the top-level decision system better means of assessing the other side's actions, signals, and intentions. Political gaming is a proven device for overcoming official cultural innocence.[19] Such exercises should involve not just lower levels of the bureaucracy, but the president and his closest political advisers in simulations with competent experts, in order to test their inherent conceptions and expectations about Soviet reactions before crises occur.

No impersonal force ordained that each nuclear superpower strive to improve its own ability to keep control and communicate in crises, while simultaneously working to blind, deafen, and decapitate the other. The maintenance of crisis-stability, with whatever policy actions that takes, should be the highest priority on the agenda of national security. ☐

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1. McGeorge Bundy, "To Cap the Volcano," *Foreign Affairs* (Oct. 1969), p. 10.
2. Dean Acheson, *Present at the Creation* (New York: Norton, 1969), p. 533.
3. Congressional Research Service, "Authority to Order the Use of Nuclear Weapons" (Washington, D.C.: Government Printing Office, 1977); Department of Defense Directive No. 5100.30, Dec. 2, 1971, as amended, pp. 1–4.
4. Paul Bracken, *The Command and Control of Nuclear Forces* (New Haven, Conn.: Yale University Press, 1983), p. 22.
5. Gerald E. Miller, "Existing Systems of Command and Control," in Franklyn Griffiths and John C. Polyani, eds., *The Dangers of Nuclear War* (Toronto: University of Toronto Press, 1979), p. 56.
6. *New York Times*, June 18, 1984 and July 1, 1985.
7. Desmond Ball, *Can Nuclear War Be Controlled?* Adelphi Paper 169 (London: International Institute for Strategic Studies, 1981), pp. 35–36.
8. Bracken, op. cit., pp. 48, 117–18, 221.
9. Bill Gulley with Mary Ellen Reese, *Breaking Cover* (New York: Simon & Schuster, 1980), pp. 178, 15, 182–84.
10. Barbara W. Tuchman, *The Guns of August* (New York: Macmillan, 1962), p. 72.
11. See for example Alexander L. George, *Presidential Decisionmaking in Foreign Policy* (Boulder, Colo.: Westview Press, 1980), pp. 37, 48; Daniel Frei and Christian Catrina, *The Risk of Unintentional Nuclear War* (Geneva: U.N. Institute for Disarmament Research, 1982), pp. ix and 115; Irving L. Janis, *Victims of Groupthink* (Boston: Houghton-Mifflin, 1972), chapter 1; Joseph de Rivera, *The Psychological Dimension of Foreign Policy* (Columbus, Ohio: Charles E. Merrill, 1968), p. 252.
12. Robert Jervis, "Hypotheses on Misperception," *World Politics* (April, 1968), p. 455.
13. Robert Jervis, "Deterrence and Perception," *International Security* (Winter 1982–83), pp. 20, 28, 252.
14. Robert Mandel, "Political Gaming and Foreign Policy Making During Crises," *World Politics* (July 1977), p. 621.
15. "Reflections on the Cuban Missile Crisis," *Boston Globe*, Oct. 27, 1982.
16. Thomas C. Weigele, "Decision-Making in an International Crisis: Some Biological Factors," *International Studies Quarterly,* vol. 17, no. 3, 1973, p. 311.
17. Irving L. Janis and Leon Mann, *Decision Making: A Psychological Analysis of Conflict, Choice and Commitment* (New York: Free Press, 1977), p. 59; Margaret G. Hermann, "Indicators of Stress in Policymakers During Foreign Policy Crises," *Political Psychology* (Spring 1979), p. 28.
18. "Report of Nunn/Warner Working Group on Nuclear Risk Reduction," *Survival,* May/June, 1984, pp. 133–35; William L. Ury, *Beyond the Hotline* (Boston: Houghton-Mifflin, 1985); Joseph S. Nye, Graham T. Allison, and Albert Carnesale, "Of Hawks, Doves—and, Now, Owls," *New York Times,* July 31, 1985.
19. For detailed recommendations see the author's "Reflections on Gaming," *Orbis* (Winter 1984).

Social scientists and the bomb

In the first five years after the development of the atomic bomb, social scientists proposed to take up where physicists had left off, and harness the social forces of atomic awareness to create a new society.

by Paul Boyer

LEWIS PAUL TODD was a young instructor at a Connecticut teachers' college when he heard the news of Hiroshima. Within hours, he began an impassioned essay published a few weeks later in a journal for high school social studies teachers. The news of August 6, 1945, he wrote, had made vividly apparent the chasm "between man's ability to solve the problems of the physical universe and his utter inability to solve social problems." The imperative response, Todd continued, must be to match the unleashing of atomic energy with "a revolution of equal force in the world of human relations." In an age of atomic bombs every other activity must be subordinated to "the job of *social engineering*."[1]

Todd was far from alone in this conclusion. Indeed, it crops up with almost hypnotic frequency in post-Hiroshima social commentary. Hiroshima, commented Lyman Bryson in a CBS radio broadcast soon after the event, underscored the urgency of applying "the same kind of thinking in managing men as we can show in managing atoms." It was high time, said the *New Republic* on August 27, for "the science of human personality and . . . society" to receive the same urgent attention "hitherto devoted to discovering the secrets of matter."

Philosopher John Dewey, who for decades had urged the application of scientific method to social problems, renewed his plea in the aftermath of Hiroshima. Writing early in 1946, Dewey lamented the "tragically one-sided development of knowledge" that had left man's social knowledge "in an infantile state" relative to his "discoveries, inventions, and technologies." "Natural science has far outstripped social science," agreed Harvard historian Sidney B. Fay in his 1946 presidential address before the American Historical Association. "We have discovered how to split the atom, but not how to make sure it will be used for the improvement and not the destruction of mankind."[2]

What was to be done? Many commentators insisted that the teaching of the social sciences, especially history, must be radically revised to reflect atomic age realities. The ferocity of World War II, culminating at Hiroshima and Nagasaki, wrote E.B. White in the *New Yorker* a few weeks after the war's end, underscored the irrelevance, if not the actual meretriciousness, of the traditional patriotic classroom approach to history, with its focus on nation-states, and their wars and conflicts. "We take pains to educate our children at an early age in the rituals and mysteries of the nation," White observed, "but lately the most conspicuous activity of nations has been the blowing of each other up, and an observant child might reasonably ask whether he is pledging allegiance to a flag or to a shroud."

In the same vein, Princeton's Christian Gauss paused in his *American Scholar* attack on the parochialism of literature teachers to take on the historical profession as well. In a misguided attempt to be "scientific," he charged, historians had "refrain[ed] from passing moral or 'value' judgments" and emphasized disembodied "historic forces" over individual choice and responsibility. Yet for all the profession's pretentions to objectivity, he went on, textbook history remained narrowly nationalistic at a time when global thinking had become essential. Gauss even implied that all history prior to August 6, 1945, had been rendered irrelevant by the atomic bomb. If historians were to play any meaningful role in the atomic era, he concluded, they would have to rethink radically the nature of their enterprise.[3]

Some social science teachers were themselves reaching the same conclusion. The social sciences would have to undergo a thorough "reconstructing and revitalizing," warned Alonzo B. May of the University of Denver, to be of much value in a society transformed by atomic energy. In an age of atomic bombs, declared Lewis Paul Todd, "the social sciences must become the keystone . . . of public education. And . . . the increased time we devote to the study of human relations must be taken from the physical sciences." Todd insisted that if the social studies curriculum were to prove equal to the crisis created by the bomb, it must be organized around a "directing moral principle" to provide the rising generation the ethical orientation it would urgently need in the atomic era.[4]

WHILE SOCIAL STUDIES teachers pondered the pedagogical implications of the atomic bomb, others spoke expansively of a vastly enlarged public role for social science. In his 1939 book *Knowledge for What?* sociologist Robert S. Lynd had called for an activist, engaged social science, and in 1945 Lynd's summons seemed more germane than ever. Within 48 hours of the Hiroshima news, a group of five prominent social scientists, including sociologist Talcott Parsons and political economist Lincoln Gordon, submitted a lengthy letter to the *Washington Post* asserting that world peace had become society's most urgent challenge in light of "the startling news of the atomic bomb"

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and that in this task the social sciences had a vital role to play. Cooperative human intelligence could solve "human problems as well as . . . those of atomic physics," they insisted, provided it proceeded according to a method, and "this method must be social science." The planning advocate Stuart Chase quickly caught the mood. "As the first item on the educational agenda," Chase wrote late in 1945, "I respectfully suggest that another two billion dollars be allocated, this time to the *social scientists.* An equally urgent directive should go along with it: [to] show us how to live with the unbelievable power the physical scientists have loosed upon us."[5]

One of the strongest expressions of this exalted view came from John S. Perkins, professor of management at Boston University. On the evening of V-J Day, Perkins wrote an article that soon appeared in *School and Society,* "Where Is the Social Sciences' Atomic Bomb?" "Man's behavior and that of his institutions must now be harnessed just as the behavior of atoms has been harnessed. This is the result the social scientists must produce. This is their atomic bomb. Can they come through?" The social scientists would succeed at this task, Perkins went on, only if they emulated the organizational genius of the atomic scientists in mobilizing "the ideas of men all over the world" in a coordinated attack on an urgent problem. Perkins summoned social scientists to something akin to a religious crusade: "The top minds of the world must be commandeered [to] harness the complex and powerful aspirations, actions, and attitudes of men and channel them into the ways of peace. This is their [Manhattan Project]. Upon their success now rests the fate of all mankind." Such a crusade, he went on, would surely win for social scientists "respect in the halls of government and in the minds of the people—respect which has been missing to a notable extent in the past. . . . The physical scientists . . . have deservedly won the praise which a still incredulous world is pouring out to them. . . . Now it is the social scientists' turn."[6]

Two outspoken advocates of a major social science response to the atomic crisis were faculty colleagues at the University of Chicago, the institution that gained so much postwar attention for its role in the Manhattan Project. They were anthropologist Robert Redfield, famed for his work on folk cultures and in 1945 dean of social sciences at Chicago, and sociologist William Ogburn, author of a classic study of social change that had introduced the phrase "cultural lag" to the language.

Discussing the "Consequences of Atomic Energy" at a symposium of educators in November 1945, Redfield struck the now familiar note: the social sciences must catch up with humanity's advancing mastery of physical forces. In an age of atomic bombs, he said, survival depended upon "the understanding and control of human relations. . . . It has always been so . . . now it is fatally so." Turning to specifics, Redfield revived a proposal first advanced in Walter Lippmann's *Public Opinion* of 1922: the creation of a high-level, permanent, and generously funded public agency, presumably made up largely of social scientists, to function as "a sort of auxiliary brain for policy forming." This "Commission of Inquiry," enjoying a prestige "comparable, perhaps, to that of the courts," would advise government officials and the public "in a semi-authoritative way" on the issues of social policy "made acute by the advent of atomic energy."[7]

Anthropologist Robert Redfield called in 1945 for a public agency with the prestige of the court system to deal with social policy issues "made acute by the advent of atomic energy."

William Ogburn, discussing "Sociology and the Atom" in the January 1946 *American Journal of Sociology,* impatiently dismissed the atomic scientists, religious leaders, and journalists who were trying to think about the social ramifications of the atomic bomb. On this subject, he said, "the ready advice of editorial writers, lecturers, preachers, columnists, and radio commentators is not worth very much, perhaps even less than the advice of natural scientists on the social implications of their discoveries." Such matters should be left to the experts: "It is the function of the natural scientist to make the atomic bomb," Ogburn testily insisted, "but of the social scientist to say what the social consequences are likely to be."

Ogburn readily conceded that the social research task would be monumental: "Over one hundred and fifty different social effects of radio" had been discovered, he wrote, and the atomic bomb's social effects might even exceed that number! Simply to investigate one small facet of the problem—the effects of the threat of atomic war on urban development—would require "a great deal of sociological research, perhaps hundreds of large projects" and governmental funding of Manhattan Project proportions.

Ogburn's article elicited a heated response from another sociologist, Donald R. Taft of the University of Illinois, who described Ogburn's article as an unintentional example of "cultural lag." Faced with a technological breakthrough of unfathomable and potentially horrendous implications, Ogburn had proposed long-term research projects on possible social effects. The "ponderous lethargy" of Ogburn's business-as-usual academic response to the bomb, Taft suggested, compared unfavorably to the social activism of the atomic scientists. Observed Taft sarcastically:

> The social effects of the bomb on the structure of our cities and on family and community life may conceivably be studied at leisure by visiting sociologists from Mars, as they paw over the ruins of the University of Chicago or of New York or of Moscow. Today's challenge of the bomb is more immediate.

Taft, however, questioned only the nature of the sociologists' post-Hiroshima public role, not the assumption that they had such a role. In the shadow of the bomb, he insisted, sociologists must direct their research to urgent issues bearing directly on mankind's survival: the roots of war, social conflict, and international tension. And they must go beyond research to social action, developing specific strategies for bringing about the "radical changes in attitudes and even in social institutions" the atomic crisis demanded, and then promoting them through political lobbying, adult education, and other "opinion-forming efforts." Sociologists must not only learn "the facts of social relations" but also "how to 'sell' these facts and their implications to policy makers; they must, in short, "use the atomic bomb crisis for such an organized large-scale development of, and application of, social science . . . as has never before been dreamed of."[8]

When William Ogburn proposed a study, of Manhattan Project proportions, of the social consequences of the bomb, one project he particularly favored was the dissolution of American cities to thwart enemy targeting.

Another well-known Chicago sociologist, Louis Wirth, echoed Ogburn's conclusions—while showing a degree of affinity with Taft's more radical perspective—in a 1947 essay, in which he agreed that the atomic bomb posed an unprecedented challenge to social science, "not only to discover ways and means of preventing civilization from committing suicide by means of this new weapon, but also . . . ways and means by which the beneficent potentialities of this new discovery can be fully exploited."

The task was a daunting one. Social scientists would have to develop new research techniques, recruit more talented students, secure large-scale public funding, and overcome the skepticism of a public chronically unable to grasp "the difference between social science and common sense." And they must confront a still more fundamental problem: the most significant social research inevitably threatened the status quo; "only the innocuous and the irrelevant are completely neutral." To expose entrenched social institutions to investigative scrutiny was "to court the displeasure, if not the outright hostility, of the dominant elements in society." This problem would become especially acute as social scientists investigated the implications of atomic energy, Wirth predicted, because experience taught that a society's "economic, social, and political arrangements" often impeded "the full utilization of scientific discoveries" for the general good. Despite the risks, social science "must . . . discharge its social responsibility by answering the larger and more important questions which society raises"—and in 1947 there seemed to be no larger or more important question than the social impact of atomic energy.

One reason sociology remained so "stunted and inadequate" and sociologists' prescriptions so often ignored by those in authority, Wirth went on, was that in the past they had "lacked the power to persuade or compel others to put [their] program into operation." In the fearful post-Hiroshima climate, however, this situation might change. Sociologists might at last be granted the functional role in social control that they had long envisioned. To prepare for this, they must not only investigate the social implications of atomic energy, but also explore the means of stimulating in the popular mind the will to use the new technology for "the achievement of a good society." In a more general cultural sense, too, Wirth concluded, the atomic bomb could enhance the status of social scientists. The very fact of their engagement with an issue of such public concern might in itself bring increased prestige and be the "catalytic agent" leading to "the development of a more adequate and publicly supported social science."[9]

QUESTIONS OF STATUS, prestige, and public acceptance were in the minds of sociologists as they speculated on their role in the age of the atom, but something more concrete was also involved. The issue of federal support for social science research was of immediate concern to sociologists from 1945 to 1950. During the war, scientific research on military projects had been funded through the Office of Scientific Research and Development, headed by Vannevar Bush of MIT. As the war drew to a close, Bush began to campaign for a continued flow of federal dollars to scientific research in the postwar period. In *Science: The Endless Frontier,* a 1945 OSRD report to President Roosevelt, Bush called for the creation of a new federal agency, the postwar National Science Foundation (NSF), as a conduit for such support. In the early postwar months—and intermittently for the next five years—this proposal generated heated debate in Washington and in the press.

Would the proposed foundation support the social as well as the natural sciences? Psychologists, sociologists, economists, and other social scientists had engaged in federally funded research through President Herbert Hoover's Research Committee on Social Trends (1929) as well as various New Deal and World War II agencies, and many now insisted that social science research be included in any postwar program of federal support of science. Vannevar Bush disagreed, however, and the original NSF bill (introduced in July 1945 by Senator Warren Magnuson) reflected his views. Influential social scientists at once raised objections. The Social Science Research Council took the lead in the campaign to incorporate the social sciences in the proposed legislation. And in October, Senator Harley Kilgore introduced an alternative NSF bill that did, indeed, include the social sciences.[10]

In the early post-Hiroshima years, then, discussion of social science's role in the atomic age frequently became enmeshed in the debate over the scope of the National Science Foundation. Not only leading social scientists, but also influential natural scientists, vocally supported the Kilgore bill. Forming the Committee for a National Science Foundation, astronomer Harlow Shapley and chemist Harold Urey secured the signatures of hundreds of scientists—including Albert Einstein, Enrico Fermi, and other notables—calling for the inclusion of "all fields of fundamental scientific inquiry relevant to national interest without arbitrary exclusion of any area." A poll of some 600 leading members of the American Association for the Advancement of Science revealed that nearly 70 percent favored federal funding of social science research. President Truman indicated his support.[11]

The issue came to a head in October 1945, when a subcommittee of the Senate Committee on Military Affairs conducted hearings on the various NSF bills then before Congress. While a few witnesses, including the spokesman for the American Chemical Society, explicitly opposed inclusion of the social sciences, most of those who addressed the matter, including J. Robert Oppenheimer, MIT President Karl Compton, Harvard President James Conant, and, of course, the big guns of the Social Science Research Council, favored inclusion.[12]

Many of these witnesses couched their support for federal funding of social science research explicitly in terms of the social crisis created by the atomic bomb. "Ignorance of the science of humanity will lead us inevitably to destruction," declared Commerce Secretary Henry A. Wallace. "Our great problems . . . are not the problems of the natural sciences," added Princeton physicist Henry D. Smyth. "They are the problems of the social sciences, and of politics and of ethics, if you like." Federally funded research that simply made possible "bigger and better atomic bombs" without helping society learn "how to live without using these new weapons," said historian John Milton Porter, president of Hobart and William Smith Colleges, would betray "the aspirations of most Americans."

This theme was stressed, too, in the extended plea for federal funding of social science research made in 1946–1947 by Talcott Parsons. The atomic bomb, wrote Parsons in the December 1946 *American Sociological Review,* had dramatically underscored "the potentialities of modern scientific technology for destruction and disruption of social life," and a social science response was imperative. While the physical scientists' "enormous popular prestige" gave an "oracular" quality to "their pronouncements on almost any subject, whether or not it falls within their field of special competence," he said, social scientists were in fact best qualified to confront the social problems science had created. Acknowledging the social sciences' "distressing history of ineffectuality" in contrast to that of the physical sciences, he insisted that in several areas—organization theory, public opinion, demography, the business cycle—it could already "deliver results of first-rate practical importance" and that on all fronts it was rapidly progressing toward full scientific legitimacy.

Parsons developed his argument in the January 1947 *Bulletin* by stressing the unity of science and rejecting any definition that would exclude the study of society. "It simply is not possible to draw sharp, clear-cut lines between the natural and the social sciences," he insisted, citing medicine as an example. "Each side needs the contributions of the others, and many of the most important problems fall across the line." Public funding of social science research, he concluded, would be a symbolically important acknowledgement that "science" was "not a mere isolated technical tool in modern western society" but a mode of thinking whose "roots penetrate to the deepest levels of our cultural and moral motivations."

A few critics, however, challenged the assertion that social science research represented the United States' greatest hope in the nuclear age. As early as November 1945, the Rockefeller Foundation's director for social sciences deplored the fact that "many intelligent people" seemed convinced that the problems of the atomic age could be solved by some "mechanistic solution" offered by social scientists. No single, comprehensive "answer" from social science, he said, would eliminate the continuing threat posed by the bomb. Another skeptic, at least in the pages of his journal, was David E. Lilienthal. In a series of annoyed entries from 1946 to 1948, Lilienthal fulminated against the widespread view that all would be well as soon as social science could "catch up" with the natural sciences. Social and political change did not come about through any "process of pure reasoning" by social scientists. Indeed it was "not affected by social scientists at all" but by technological and scientific developments. The social scientists "merely record changes that have occurred, or predict ones to come, or analyze the facts, etc." It was therefore vain, Lilienthal believed, to look for an answer to the atomic dilemma through the accumulation of social science data.[13]

Religious writers also denigrated the hopes some were investing in the social sciences. L. Harold DeWolf of the Boston University School of Theology rejected the widespread assumption that mankind's plight was "due to a cultural lag in which the physical sciences have too far outstripped the social sciences." He also challenged the belief, implicit in this assumption, that while technological and scientific advances had both positive and negative potential, social science research would be used only in beneficent ways. Pointing out that Hitler and Stalin had perfected sophisticated techniques of social control, DeWolf held that "the power given by the study of man," no less than the power given by nuclear physics, "can be used for either good or ill." Volumes of social research might accumulate, but the question of the ends of that knowledge would remain, and social science could never in itself provide the answer.[14]

Meanwhile, the proposal for a National Science Foundation had become involved in numerous other controversies and political cross-currents, and not until the spring of 1950 was the enabling legislation finally passed. As ultimately set up, the NSF was mandated to support basic research in the "mathematical, physical, medical, biological, [and] engineering" sciences, though a loophole reference to "other sciences" opened the door to the social sciences at least a crack.[15]

DESPITE THE SCATTERED notes of caution, the conviction that social science could resolve the atomic dilemma found many adherents in these years. Indeed, a few social scientists actually tried to apply their expertise to specific atomic-bomb-related issues. The results were not encouraging. In his 1946 essay, "Sociology and the Atom," for example, William F. Ogburn devoted considerable attention to a single issue: the relocation of city dwellers as a response to the danger of atomic attack. Ogburn began with the premise that such an urban dispersal project was necessary and desirable. Down-playing the daunting practical difficulties of such an undertaking, as well as warnings that forced relocation would turn the United States into a police state, Ogburn discussed this bizarre idea as though it were, in fact, a serious policy option. Tapping into the nightmare visions of urban destruction that had swept over America, Ogburn built a case for breaking up the nation's cities into hundreds of small towns scattered across the countryside. Those who found such ideas "utterly impracticable," said Ogburn, should consider that an atomic war could wipe out "fifty million city dwellers in a few minutes." Citing his own institution as an example, he acknowledged that "to move the University of Chicago a hundred miles away" might seem "a very difficult task," but insisted that "a crisis great enough to spur us to dismember our cities is almost sure to come sometime. But then it will be too late. Are we farsighted enough to act in advance?"

With analytical precision, Ogburn calculated that the cost of breaking up America's cities into a thousand smaller ones would be $250 billion, "less than the cost of the Second World War to the United States and perhaps less than the cost of a third world war." He also introduced historical precedent:

> The Pueblo Indians once moved their cities from the plains, where they were the prey of their warlike enemies, and set them in caves scooped out of canyon walls high above the river. This was a task as difficult for them, perhaps, with their simple tools, as a decentralization

"The current buildup of nuclear weapons is not making this country stronger but is more likely to lead us into a nuclear war that will destroy us..."

–Charles Schwartz, physicist, U.C.-Berkeley

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Further, he pointed out, urban dispersal would simply restore city dwellers to the state of their ancestors: "We lived as a race for hundreds of thousands of years without cities. In fact, we have lived in cities scarcely a century; seventy-five million of us . . . live away from cities now." While abandoning the cities might involve a "possible loss of advantage from our urban civilization" the quality of life might be "much better with well-planned smaller cities and towns."

While serious discussion of the urban dispersal option was widespread in the late 1940s, Ogburn's pronouncements illustrate how the early discussions of the bomb's implications often moved in well-worn grooves, involving, in this case, two familiar themes in American social thought: hostility to the city and a strong social-control impulse toward the urban masses.

The most significant cooperative social research projects inspired by the atomic bomb in the immediate post-Hiroshima years were those sponsored by the Social Science Research Council. Early in 1946, the SSRC set up a Committee on Social Aspects of Atomic Energy, funded by the Carnegie and Rockefeller Foundations and chaired by Winfield W. Reifler, an economist at Princeton's Institute for Advanced Study. The other members were sociologists Rensis Likert of Michigan and William Ogburn; demographer Frank W. Notestein of Princeton; economist Jacob Marschak of Chicago; strategist Bernard Brodie of Yale; and, representing the atomic scientists, I.I. Rabi and Henry D. Smyth.

This panel sponsored two studies published in 1947: *American Opinion on World Affairs in the Atomic Age,* based on a 1946 opinion survey, and *The Problem of Reducing Vulnerability to Atomic Bombs,* a strategic essay by Ansley J. Coale, a young economist and demographer who would go on to a distinguished career at Princeton. The former, with its internationalist flavor and presumption in favor of the Baruch plan, reflected the political climate of early 1946. The public opinion data revealed a frightened and confused public, but offered little of value to policymakers. The Coale essay, by contrast, reflected scant confidence in international control and urged U.S. atomic superiority and a vigorous program of civil defense as the most promising avenue of security. These two studies reflect in their contrasting emphases the political sea change already underway in 1946–1947. Neither, however, bore out the oft-repeated claim that social science had profound and original insights to offer a society terrified of the bomb.

Whether intimidated by the very grandiosity of the post-Hiroshima summonses to the social scientists, or chastened by the disappointing results achieved by those who heeded that summons, few American social scientists followed in Ogburn's footsteps. In the *New York Times Magazine* on the fifth anniversary of Hiroshima, a former Federation of American Scientists publicist wrote: "In the first reverberations of Alamogordo, [the atomic scientists] knew that the questions raised there would not be answered by physical science. Still devout in their belief in progress and reason, they waited for the answer from social scientists. They are still waiting."[16] Despite all the postwar calls for research on the social implications of the bomb, agreed Chicago sociologist Edward Shils in 1957, practicing social scientists had, with few exceptions, "remained aloof." "Sociologists took no interest in these matters," he has recently reiterated.[17] Nor did the the calls for a reformation of social studies teaching bear much fruit. A 1949 U.S. Office of Education study concluded that while the "Atomic Age" phrase had been widely adopted by authors and editors as "a good interest-catcher . . . which proves their book is 'up-to-date,'" few books went beyond "generalities." While insisting that "American democracy must 'meet the challenge of the Atomic Age,'" this study concluded, few textbooks offered any specifics "about what the Atomic Age means or what kinds of challenges we should prepare to meet."[18] This, in itself, is a fair summary of the results of the postwar enthusiasm for research on the social implications of the atom. ☐

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1. Lewis Paul Todd, "Atomic Energy and the Coming Revolution in Education," *School and Society* (Oct. 27, 1945), p. 258.

2. Sidney B. Fay, "The Idea of Progress," *American Historical Review* (Jan. 1947), p. 245; Lyman Bryson, CBS radio broadcast (Aug. 12, 1945), in Sydnor H. Walker, ed., *The First One Hundred Days of the Atomic Age* (New York, Woodrow Wilson Foundation, 1945), p. 15; "Atomic and Human Energy," *New Republic* (Aug. 27, 1945), p. 241; John Dewey, "The Crisis in Human History," *Commentary* (March 1946), p. 9.

3. Christian Gauss, "Is Einstein Right?" *American Scholar* (Autumn 1946); E.B. White, *The Wild Flag: Editorials from the* New Yorker *on Federal World Government and Other Matters* (Boston: Houghton Mifflin, 1946), pp. ix, x.

4. Todd, "Atomic Energy," p. 258; Alonzo B. May, "Atomic Energy and the Liberal Arts," *School and Society* (Aug. 24, 1946), p. 133.

5. Stuart Chase, "The New Energy," *Nation* (Dec. 22, 1945), p. 710; George S. Pettee, Talcott Parsons, H. Van B. Cleveland, Lincoln Gordon, John Lydenberg, "Atomic Power: A Communication, August 8, 1945," *Washington Post* (Aug. 19, 1945).

6. John S. Perkins, "Where Is the Social Sciences' Atomic Bomb?" *School and Society* (Nov. 17, 1945), pp. 316–17.

7. Robert Redfield, "Consequences of Atomic Energy," *Phi Delta Kappan* (April 1946), pp. 223–24.

8. Donald R. Taft, "The Atom and Sociology," *American Journal of Sociology* (May 1946), pp. 558–59.

9. Louis Wirth, "Responsibility of Social Science," *Annals of the American Academy of Political and Social Science* (Jan. 1947), pp. 143–44.

10. James L. Penick et al., eds., *The Politics of American Science, 1939 to the Present* (Chicago: Rand McNally, 1965), pp. 72–89.

11. Howard A. Meyerhoff, "The Committee for a National Science Foundation," *Science* (Jan. 4, 1946), pp. 11, 103; "The National Science Foundation: S. 1850, Final Senate Bill," *Science* (March 1, 1946), p. 271.

12. Penick, p. 81.

13. Joseph E. Willits, "Social Adjustments to Atomic Energy," *Proceedings of the American Philosophical Society* (Jan. 1946), p. 48; David E. Lilienthal, *The Atomic Energy Years* (New York: Harper & Row, 1964), pp. 112–13, 295.

14. L. Harold DeWolf, "Religion in an Age of Science," *Journal of Bible and Religion* (Oct. 1948), pp. 202–3.

15. "The National Science Foundation Act of 1950," *Bulletin* (June 1950), pp. 186–90.

16. Michael Amrine, "What the Atomic Age Has Done to Us," *New York Times Magazine* (Aug. 6, 1950), p. 27.

17. Edward Shils, "Freedom and Influence: Observations on the Scientists' Movement in the United States," *Bulletin* (Jan. 1957), p. 16; Shils, personal communication to author, Jan. 30, 1985.

18. Dorothy McClure, "Social Studies Textbooks and Atomic Energy," *The School Review* (Dec. 1957), p. 542.

A Soviet view of nuclear winter

International scientific research points to a unanimous conclusion: the world is too small for nuclear war, and the "worst-case" scenario should be the operational model.

by Sergei Kapitza

RECENT research on the global consequences of a nuclear war raises a number of questions that have to be discussed in order to put these remarkable findings in their proper place. The main result is that even if one-third of all weapons are used, the changes in climate lasting for months will drastically affect life on our planet. It was known that nuclear weapons through blast, thermal radiation, and radioactivity would lead to enormous numbers of casualties and inflict irreparable damage on cities and factories, power stations, and oil fields and ruin the complex infrastructure of modern industrial and urban life, apart from the immediate destruction of military installations that are considered to be the primary targets of war. Now a new dimension has been added, a global one. We have discovered that our planet is simply too small to cope with the shock of a major nuclear war.

This result is of great importance, for it basically changes our apprehension and attitude toward nuclear war. These findings have been recognized by the scientific community for two years, and an immense literature has emerged. Further research has led both to wider exploration of global consequences and to a more detailed examination of the way dust and soot injections change the atmosphere and how they are finally washed out.

The most recent summing up on these matters—done by a committee appointed by the U.S. National Academy of Sciences at the request of the Department of Defense—substantiates these findings and recommends further research. On the other hand, in a significant number of Soviet publications examining the same problems my colleagues have come to very similar decisions concerning the basic concepts for the global consequences and related phenomena.

Research that is truly international in scope and authorship has been done, and important contributions have also been made by German, Swedish, and Australian scientists. A remarkable correspondence in the results and attitudes to which scientists have come—if not starting from different premises, but using different models and methods and following various traditions of research—has emerged. This variety of approaches, which can lead to a discrepancy of results taken at face value, of professional arguments on details and numbers really contributes to the "robustness" of the concepts discussed, rather than signalling any inherent weaknesses in the findings.

Here it would be interesting to note that in the critical studies and discussions of these results, scientists by the very nature of their training and pattern of investigatory thinking usually retreat to a position that may be summed up as a "best case" analysis: by their very spirit scientists are prone to take risks. It is well known that in the tradition of military thinking one is supposed to be prudent and in the case of limited intelligence pursue "worst case" strategy, ascribing to your real or imaginary opponent the greatest possible might and evil and taking the least possible risks in making decisions.

The persistent use of worst-case thinking over the last decades has led to the present monstrous buildup of weapons. But I do think it would be right to use this approach in evaluating the risks of the global consequences of a nuclear war, the risk of a nuclear winter, and to rely on the worst possible case in making fateful decisions for mankind. We are facing a catastrophe with a finite probability of happening in a case of practically infinite losses. This point in risk evaluations was forcefully brought up by Academicians A. Obuckov and G. Golitzin at [a Soviet] national conference on the danger of nuclear war in May 1983. At this meeting in an important contribution Academician L. Feoctistov also underlined the possibility of increasing by many times the bombs' effects by targeting, as for example by hitting nuclear power stations. Forest fires will multiply the thermal output of nuclear explosions by many times, and he pointed out the effects of smoke in obscuring the sun, with disastrous consequences for the atmosphere and the earth's ecosystem. Finally, an important event in 1983 was the "World after Nuclear War" conference in Washington, D.C. when the whole issue soon became public.

If one wants to find a useful image of what we can expect, the studies of natural calamities are instructive. The 1815 eruption of Tambora, in Indonesia, is of great interest, for in this case we can definitely identify global catastrophic changes in the weather that affected North America and Europe in 1816, which came to be known as "the year without a summer." To Tambora we can trace the world epidemic—a pandemic—of cholera that started in 1815 in India and Persia and went on for nearly 20 years.

I cannot refrain from mentioning the effect of these events on the world of writing. It was in the fateful summer of 1816 that Lord Byron wrote "The Darkness," by far the best description of a nuclear winter to be found in literature.

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At the same time and place Mary Wollstonecraft Shelley wrote *Frankenstein*, a novel and name that have now become symbolic of technology ruling man. The consequences for Russian literature were no less remarkable, for in the fall of 1830 Pushkin was held up by the cholera quarantine in his manor house near Nizny Novgorod (now Gorki) for a couple of months while he wrote perhaps his best poems and short stories. Without his "Boldino Autumn," as it became known, Russian literature would be quite different.

I mention these strange links not for their sentimental value. Rather, they are remarkable demonstrations of the connections in our life and culture of the often poorly understood and usually never properly recognized interrelations that occur in life and which to a great extent constitute life itself.

IN CONSIDERING the damage and fatalities in a nuclear war it is instructive to note that since the invention of the bomb and testing all further research shows that the initial dangers were systematically *underestimated*. The first radiation doses were larger than those deemed permissible today. Only after a series of large atmospheric nuclear tests were the real dangers and magnitude of fallout recognized and the importance of biological chains in concentrating radioisotopes understood. Recently doctors have come to understand that all our medical facilities will be inadequate, to say the least, and have seriously upgraded the expected human losses. We have just seen how late the global consequences came to be known. This list will certainly grow, for I think that we have not yet fathomed all the depths of the horrors that we can expect, including our chances with civil defense and long-term genetic damage. One thing is obvious: nothing except our understanding has become better. That is an important lesson worth remembering. In the case of nuclear winter, this concept has come to stay with us. We cannot disinvent it, even if future research clarifies some details and imposes certain limits.

Returning to the global consequences of nuclear war, we have to consider, if not explain, why we have only now come to recognize these global effects, although atomic bombs were invented 40 years ago. I would especially like to note that the alarm was first sounded by independent academic and university scientists, not by those at the great secret laboratories for nuclear armaments, who should have been the first to comprehend the full consequences of their inventions. I must admit that some did try, but they did not succeed in getting their signal out of the scientific-military establishment, to make themselves heard and understood, to communicate with the body politic and the public at large. Now they are joining in this research where their professional knowledge is certainly welcome. Highly specialized scientists, working in strictly compartmentalized military research establishments usually lack the broad understanding without which it is practically impossible to profitably explore and work on interdisciplinary problems. In fact, modern education and the way science is organized also do not help in these studies.

Global problems gained general recognition during the last decade. The standard list includes the environment, energy, resources, water, food, population, and, last but not least, the arms race. Global problems are certainly the most complex and interconnected phenomena of our time, and we face great difficulties in comprehending them, in developing our attitudes toward the issues at stake and the grave decisions that we will have to make. The longer we wait, the greater these problems will become, looming on our common horizon. As a simple fact, take, for instance, the global effects on our climate of the growth of the content of carbon dioxide in air. Over the last 40 years it has increased by more than 10 percent, and by 15 to 30 percent since the industrial revolution (1850). What are we heading for? We do not know, except that it is connected with many global problems. This change in an important component of our atmosphere is not only the obvious result of fuel being burnt, but we also have to take into account the decrease in forests, pollution of the oceans, and other effects acting over a long time and interacting with one another.

In the case of the global consequences of a nuclear war, the effects, although quite complex, are better understood; they happen on a much shorter time scale and will have an immediate and profound effect on our life and environment. We will face global climatic changes, and there will be no safe haven on our small planet. All our familiar world connections of trade and commerce, knowledge and industry will be lost, not to mention the financial system and world banking, which may even collapse on their own.

I have not here gone into any of the details of the extinction of species in a nuclear winter and the fate of the biosphere. This I leave to your own devices and the extensive literature available. I only think that you will have to go to the very limits of your imagination to get any idea of what can happen.

Scientists can develop and elaborate these ideas and present the facts and numbers. What we are talking about is really the fate of the earth, of a planetary catastrophe. Life has existed on our planet for more than three billion years. On a number of occasions the evolution of life has been punctuated by mass extinctions. The last spectacular one happened some 65 million years ago when perhaps 80 percent of all forms of life perished, including the dinosaurs. We do not exactly know what happened, but it was not the fault of these hapless monsters. It could have been a giant meteorite, or rather an asteroid some 10 kilometers in size. It could have been some unknown process in the geological and biological history of our planet. Some day we will know better. I have brought up this remote subject primarily because this research helped to develop our understanding of the mechanism of a nuclear winter.

I have also brought it up because throughout human history great minds—philosophers and religious thinkers—have developed our attitudes toward matters of death, to the finite limit of our life. Eschatology is not a well known or popular subject. Even on a personal level death is not an easy subject to think about. Moreover it is normal not to think about these matters in everyday life. But all philosophical and religious systems dealing with the human spirit have developed as a part of morality, as a basic concept in our existence and behavior. But the end of the world is a powerful concept that could have helped to establish norms of human conduct. In fact, we can think of it as an instrument of *moral deterrence*, introduced by society and meant for the individual.

I DO NOT WANT to go into discussing the implications of nuclear deterrence, as the subject is very complex. I would only like to remind you that nuclear weapons at the beginning of the arms race were built in the Soviet Union in pursuit of parity and deterrence, among other things. Before the invention of the atomic bomb, there was the battle between the sword and the shield, between armor and guns. Inventions in defense always seemed feasible. With the emergence of nuclear weapons, defense has lost and deterrence has taken its place in the symmetry of might that is now a dubious contribution to peace. One can presume that future developments will show that in this world of overkill parity, defense has become even more futile, whatever the promise of modern technology. One cannot expect a technological breakthrough, a fix that will change the great inherent imbalance of offensive weapons that has developed over these years. This is really the reason for deterrence, however distasteful the concept may be, and why, quite apart from the technological problems, defense is practically impossible, for we have to have an absolute system of defense against the absolute weapon that we have already built.

Deterrence is based on fear, and it is a dear price we are paying in our societies by demoralizing life, by offering no hope for a future that is overshadowed by the menace of arms. Today just as science and progress have generally erased much of the moral power of hell and heaven, by the sheer multiplication of nuclear weaponry we have undermined the primary concept of bilateral deterrence, for today all of us are held hostage. Even if one power strikes, the consequences will be global and retaliation automatic. We face a common danger and have to seek common security. By the accumulation of huge arsenals, doomsday has become a physical reality, a thing that can happen. By becoming a reality, it loses much of its power of deterrence and degenerates into fear.

I am proud to say that the Soviet government was early in recognizing that nuclear weapons have ceased to be an instrument of war and can serve no military purpose. This attitude has found its expression in the no-first-use pledge.

We must stop the nuclear arms race, for there is no alternative except suicide for mankind. The first and simple step is to stop all testing and development of nuclear arms. Enough is enough. You know the facts—there is no plausible scientific or technical case for continuing testing. Perhaps this would generate some hope and be a signal of reason.

Atomic bombs were born in great secrecy, and this still haunts them. The United Nations operates in the open, and the scientists who come here also have no secrets—if we discover one secret of nature the first thing we do is to publish it, and that is how science is made.

In our interactions with society we have all painfully learned that human nature and our social behavior change much slower than our means. This is one of the fundamental issues of our time, one of the main reasons for many of the difficulties facing us in different countries and different societies with a variety of histories; we now all face the common power of modern science and technology.

I hope that the great social problems facing us will be peacefully resolved by the development of responsible social reasoning, by scientific socialism. We always have to bear in mind that our world is now too small for a modern war. "We have to learn to think in a new way. Remember your humanity, and forget the rest. If you can do so, the way lies open to a new paradise; if you cannot, there lies before you the risk of universal death." These passionate and wise words were written 30 years ago by Bertrand Russell in a message signed by a number of other great men. Since then this message, the Russell-Einstein Manifesto, has become a testament for all responsible scientists. ☐

This article is based on a talk given at the United Nations in January.

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Deterrence: from fear to interdependence

The fear underlying both the arms race and deterrence has overriden other powerful motives for accommodation, such as survival and economic self-interest.

by Edward F. Snyder

THE UNITED STATES' survival, and even the fate of the world, now depend on the flawless operation of deterrence by fear of retaliation—the cornerstone of U.S. military and security policy. Much of the discussion about deterrence, however, concentrates too much on military hardware, or relies too heavily on legal formulas or on arms control and arms limitation measures. The psychological, political, and economic structures resulting from human frailties, and nearly 40 years of reliance on deterrence by fear, are so deeply entrenched that measures which do not alter basic assumptions will have little effect in reversing the arms race.

Observers from left to center to right confidently assert that "deterrence works." Their view is usually based on the fact that there has not been a nuclear war since 1945. But that pragmatic conclusion is questionable on several grounds. The passage of 40 years does provide some evidence, but 40 years is a very short time in human history to validate a doctrine. Drawing conclusions from the mere passage of time is especially hazardous when dealing with a policy in which the consequences of just one failure would be so catastrophic. Indeed, the deterrence doctrine has a built-in assumption that it may fail. If that possibility were not present, the other party would cease to be deterred.

The thesis that "deterrence works" also overlooks the possibility that restraint may have been exercised by one or both parties for more positive motives than fear of retaliation. Further, this view of deterrence spares the homelands of the superpowers; they carry on their conflicts in conventional proxy wars, while the people of Indochina, Afghanistan, Central America, and elsewhere do most of the fighting and dying.

But the most persuasive evidence to me that deterrence is not working lies in the dangerous trend in international affairs. Thirty years ago, when the United States was in the midst of its first nuclear weapons buildup, many members of Congress, editorial writers, and others expressed the view that increased military forces were temporary expedients necessary to "buy us time" and provide a "shield." Behind this shield and with this time, the United States and other nations would work toward world disarmament under effective international controls and international law. Today that rationale is seldom heard. More often, weapons systems are rationalized as useful to buy time to build more weapons. The vision of a disarmed world under law is receding further and further into a distant future, and we seem to be resigned to an endless arms race which we can only hope against hope will not end in disaster.

Even those international controls on nuclear weaponry which were put in place some 15 years ago, like the Nuclear Non-Proliferation Treaty and the ABM Treaty, are weakening. The Threshold Test Ban, the Peaceful Nuclear Explosions, and SALT II Treaties have never been approved by the Senate. Nuclear proliferation is a constant danger. Few people today are even aware of the landmark 1961 McCloy-Zorin agreement on principles for general and complete disarmament under international control. Indeed many "freeze" advocates argued against reference to the McCloy-Zorin agreement in the 1983 House freeze resolution, fearing it would hamper chances for passage. In 1981 the House almost succeeded in deleting the word "disarmament" from the title of the Arms Control and Disarmament Agency.

Moreover, efforts to create international institutions and multinational alternatives are being undermined. The United States has restricted the role of the World Court in the Nicaragua dispute. It has withdrawn from UNESCO, has drastically reduced U.S. support for the World Bank affiliate, the International Development Association, and is now proposing a 50 percent cut in the U.S. contribution to UNICEF. At the same time, the Third World is increasingly militarized and impoverished by regional arms races.

HOW DID WE GET into such a fix? How can it be that with skilled negotiators on both sides, with the survival of their own nations and even of civilization at stake, humanity continues to slide toward catastrophe? Reasonable people can differ as to the cause. I myself do not ascribe the primary cause to intransigence, malevolence, greed, technology, or power-hungry policies of either party. Rather, fear is the root cause of the current arms race; and the doctrine of nuclear deterrence by fear of retaliation, which lies at the heart of our national security policy, is the engine driving us toward destruction.

Fear is a corrosive emotion. It clouds good judgment and breeds suspicion, mistrust, and irrational behavior. President Franklin Roosevelt sought to rescue the nation from fear's grip on domestic policy in 1933, declaring: "The only thing we have to fear is fear itself." Eight years later in his State of the Union message, he identified "freedom from fear" as one of the "Four Freedoms." To achieve this freedom, he called for "a world-wide reduction of armaments to such a point and in such a thorough fashion that no nation

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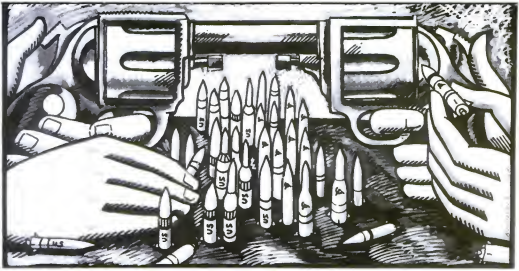

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will be in a position to commit an act of physical aggression against any neighbor anywhere in the world." We have retained that goal but are now using fear as an implement to achieve it.

The creation and maintenance of fear is what deterrence is all about. Reliance on deterrence became the centerpiece of U.S. security policy when the Soviet Union developed hydrogen bombs deliverable by intercontinental bombers, and then missiles. Since it was no longer possible for the Defense Department physically to prevent all Soviet bombs from being delivered on U.S. targets, it became necessary to devise a policy to prevent—that is, deter—them from being launched in the first place. The focus of U.S. defense policy thus shifted away from objective criteria for military adequacy and centered instead on the minds and perceptions of Soviet decision-makers. As the Scowcroft Commission report put it: "Deterrence is the set of beliefs in the minds of Soviet leaders, given their own values and attitudes, about our capabilities and our will."

The U.S. capability to inflict terrible retribution became available in the 1950s. Demonstrating a continued will or readiness to use these awesome weapons has been more difficult. The huge numbers of powerful weapons added to the U.S. and Soviet arsenals in the last three decades, the escalating military budgets of both countries, and the suggestion of ever more provocative policies such as "limited nuclear war" and "war-fighting" are more readily comprehensible when seen as a part of this continuing demonstration of national will.

Ironically, short-run success of the nuclear deterrent breeds long-term problems. The fear created in the minds of the adversary nation's leaders may deter immediate attack or prevent intimidating threats, but it also brings mistrust and suspicion. The weapons which the builder intends only for its defensive deterrent purposes appear to the other to be part of an aggressive policy. Not surprisingly, countermeasures lead to a spiraling arms race. The mutual fears generated by this process are very likely to breed dangerous misperceptions, denial of reality, and irrational behavior. Yet the deterrence theory requires leaders to respond with rationality and perceptivity, especially in time of severe crisis.

Perhaps most importantly, deterrence requires that a high level of fear and mistrust be maintained among U.S. citizens so they will pay taxes to buy ever more destructive weapons and support belligerent actions and policies which help to demonstrate a continuing will to use these weapons of mass destruction. But for citizens to be willing to accept responsibility for the enormity of the use of nuclear weapons, which would result in casualties in the tens of millions, they must be conditioned to regard the "enemy" as dehumanized. Hence reports of Soviet transgressions are almost always magnified, while reports of cooperative efforts are minimized. Having an enemy, an outsider, on whom to project our own frustrations and inadequacies is also a most useful rationalization to avoid accepting responsibility for our own internal failings and our own role in international conflicts.

This climate makes it extremely difficult to negotiate arms reductions. Even the modest SALT II Treaty, agreed to by generals and admirals in Washington and Moscow, was never approved by a Senate which was responding to that part of the public which had been conditioned by more than three decades of fear and suspicion.

The theory has been that it is possible to have a two-track, arm-while-parleying approach. Thirty years ago, even 10 years ago, one could have argued that such a policy might be successful in reversing the arms race. But this rationale is wearing thin. The record shows that the dynamics of deterrence give high priority to arming and a distant second place to parleying. We passed the point of a "stable" or "minimum" deterrent without even pausing to notice. Various "gaps" and bargaining chips have come and gone. The arms race, having exhausted most earthbound aspects, is now moving into space. Meanwhile, the Geneva negotiators are settling in for a very long, frustrating, unproductive talk-fest on strategic, intermediate-range, and space weapons. The nearly completed talks on a comprehensive test ban have been shunted aside, and the chemical weapons race is heating up.

WHAT IS THE alternative? We in this nuclear-space age are much like the bird transfixed by the snake. Our fear paralyzes us, and our fascination with the danger of nuclear weapons makes it almost impossible to avert our gaze and find a path to safety.

Certainly Soviet leaders must be deterred or, more accurately, dissuaded from launching an attack on the United States or using weapons of mass destruction for political intimidation. And our own leaders must be similarly dissuaded.

Perhaps a clue to how this may be done lies in the way the three Western nuclear powers—the United States, Britain, and France—avoid the deadly politics of fear. Each of these countries could use its nuclear weapons to obliterate completely or at least wreak terrible havoc on the others. But such acts are unthinkable. These nations have many conflicts, but the pressures they apply never include the nuclear dimension. The threat to use nuclear weapons on Paris, London, or Washington by any of these three is simply beyond any range of acceptable options. Each nation is effectively deterred, or dissuaded, by a relationship of interdependence and a sense of common security and common humanity.

The United States is, of course, far from such a relationship with the Soviet Union, but this model offers a clearer sense of direction. Survival and economic self-interest provide two powerful motives for accommodation, but so far they have been overridden by the politics of fear.

How do we create a relationship that moves toward common security? Specifically, a policy of deterrence—or dissuasion by interdependence—might incorporate the following points:

Maintain all existing arms control treaties and stop building or deploying new weapons which can be perceived as part of a first-strike policy.

Move current arms control negotiations to the back burner, reducing expectations for their success until the political atmosphere has improved. Meanwhile, support efforts by third-party nations to play a mediating role in U.S.-Soviet arms negotiations, and push ahead on various modest proposals for crisis-control centers and military confidence-building measures in Europe.

Give certain so-called "peripheral" or "long-range" aspects of U.S.-Soviet policy, which involve communication, cooperation, and attitudinal change, the high priority they deserve. These programs are sometimes belittled in comparison with arms control efforts. Yet, by any test, more progress has been made toward better relations via these programs in the past 30 years than through abortive efforts to reduce arms. These are important national security programs in their own right. With respect to this last point, the United States should seek to:

- Increase communications and exchange of persons, including meetings between President Reagan and General Secretary Gorbachev, members of Congress and Soviet political leaders, high-level military officers, regional and local government officials, scientists, educators, youth—the whole range of professional, cultural, and private life. The need to understand the other side's world view must be stressed continually and with the highest priority, no matter how much one may disagree with it.
- Expand the bilateral scientific and technical exchange programs begun under the Nixon-Brezhnev agreement of 1972 and publicize the many mutually beneficial aspects of these programs. Six are currently operative in the fields of medical science and public health, agriculture, environmental protection, housing, and peaceful uses of atomic energy.
- Renew the five programs which have expired. These pertain to space cooperation, world oceans, energy, transportation, and scientific and technical cooperation.
- Stop linking constructive programs to odious Soviet actions. The practice of terminating or postponing significant cooperative endeavors in order to express displeasure demeans the importance of these programs, which are essential in creating a climate for avoiding nuclear war.

Remove restrictions on trade in peaceful goods with the Soviet Union. U.S.-Soviet trade is clearly a political as well as an economic issue. Normalization of that trade is one important indication of progress toward better relations, as is currently being demonstrated between the United States and the People's Republic of China. Unfortunately, U.S.-Soviet trade is still inhibited by the Jackson-Vanik amendment of 1974 and the Stevenson amendment of 1975.

Recognize that Soviet and U.S. actions and reactions in Afghanistan, Indochina, the Mideast, Angola, Cuba, and Central America have played a dominant role in worsening U.S.-Soviet relations. A major effort should be made to develop a feasible U.S.-Soviet *modus vivendi* in the developing world. It should include bans on the use of combat troops outside national borders, on proxy states' combat troops, and on direct or covert mercenary, paramilitary, or "volunteer" forces. Military aid, advisers, and arms shipments should also be restricted. Self-determination, human rights, and the wishes of the people in the region must be respected.

Since deterrence by fear is leading us inexorably toward catastrophe, we must shift to a new goal of interdependence and common security. The first steps on that road require modest, but proven, programs of joint cooperation and mutual benefit. In an improved political climate, undergirded by a new psychological maturity, significant arms reductions can then take place. ☐

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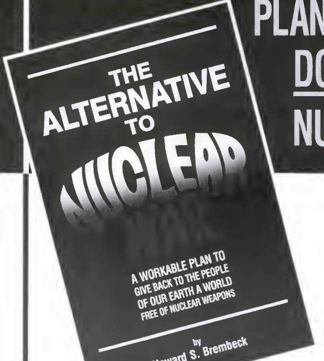
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The Wizards of Armageddon
by Fred Kaplan
Simon and Schuster, 1983
464 pages; $18.95; $9.95, paper

Counsels of War
by Gregg Herken
Knopf, 1985
409 pages; $18.95

reviewed by Leonard S. Rodberg

From the earliest days of the nuclear era, the writings of "defense intellectuals" who were attempting to define nuclear strategy have fascinated both the reading public and, especially, academic writers. This interest may owe more to the fact that these strategists were working in the realm of ideas, with which this audience feels comfortable, than to the political or practical impact which the strategists might have had. Certainly, the nuclear juggernauts of both the United States and the Soviet Union do not testify to any great influence of sophisticated military analysis.

Fred Kaplan, a young student of defense policy, has written a spirited and exceedingly readable history of the main strands of U.S. nuclear strategy. He focuses on the social scientists who worked at, or circulated through, the Rand Corporation, a creature of the Air Force which played a salient and, it must be said, baleful role in defense analysis through the 1950s and 1960s.

Kaplan's technique is to follow the evolution in the thinking of several key individuals whose theories characterized strategic thinking during this period: Bernard Brodie, Albert Wohlstetter, and William Kaufmann each played a central role in the development and promotion of particular strategic concepts. The development of Brodie's ideas especially provides Kaplan a touchstone in tracing this history.

Brodie was one of the earliest of the defense intellectuals, progressing from being at Yale an early advocate of nuclear deterrence to leading the way at Rand in developing notions of the "limited" use of nuclear weapons. By the time of his death in 1978, however, he had rejected the ideas he had helped originate while serving the Air Force at Rand. In his work at Rand, he had felt that the concepts of "flexibility" and "options" were what constituted nuclear strategy. By the end, he had concluded that they were illusions, given the destructiveness of nuclear weapons and the uncontrollability of strategic warfare. This contradiction between theory and reality provides the central theme of Kaplan's book.

William Kaufmann emerged in the late 1950s as a principal spokesman for what Kaplan describes as "limiting, controlling, rationally calculating" the use of nuclear weapons. Kaufmann urged the view that nuclear weapons should be used as arms have always been used: against military targets. Shuttling between academia and the defense establishment (where he was a principal speechwriter for Defense Secretaries Robert McNamara and Harold Brown), he was a key proponent of the counterforce view of nuclear warfare.

Kaufmann was also an adviser to Kaplan on the doctoral thesis which provided the foundation for this book, but this does not prevent the author from being highly critical of Kaufmann's views. Kaplan concludes, for example, that the attempt by Kaufmann and other Rand-oriented analysts to rationalize nuclear warfare has failed. War games and "scenarios" in which nuclear weapons are initially used in a limited way all lead, eventually, to a nuclear holocaust. The weapons are too powerful, their secondary effects (fallout, disruption of communications, social disorder) too widespread, the likelihood of confusion and misunderstanding in military command and control systems too great, for the fine distinctions of military theorists to hold up in the real world.

Kaplan concludes, finally, that the Rand-centered analysts failed: "It was, after all, only rational to try to keep a nuclear war limited if one ever broke out. . . . Yet over the years, despite endless studies, nobody could find any options that seemed practical or made sense. The nuclear strategists had come to impose order—but in the end, chaos still prevailed."

Kaplan's book is superb, if read as the story of the evolution and ultimate failure of these ideas. And it is more readable than most books on the subject, principally because Kaplan, through nearly 200 interviews, provides a lively view of his subjects as more than intellectuals obsessed with the "unthinkable."

The book, however, claims to be something more than this, and here one must have reservations. Intellectual history is tricky business, tracing the flow of ideas is not easy, and Kaplan is not a historian. He relies chiefly on the perspectives of some key individuals to whom he was close or whom he was able to interview, and he focuses on one institution, the Rand Corporation. As a result, much is omitted. For instance, he makes no mention of Henry Kissinger's 1957 book, *Nuclear Weapons and Foreign Policy,* perhaps the most influential work in legitimizing the idea of using nuclear weapons in a limited war.

Also left out are those intellectuals, mostly natural scientists, who propounded ideas of minimum deterrence and arms control. Although they played an important role in the 1960s—especially in connection with the limited nuclear test ban and the ABM debate—they never appear in Kaplan's book.

(Their ideas do appear briefly at one point. While tracing the flow of Kaufmann's counterforce ideas, Kaplan tells of a report, identified as WSEG-50, which rejected counterforce ideas as unworkable and advocated a finite-deterrence strategy. Produced by the Weapons Systems Evaluation Group, an analytical group serving the Joint Chiefs of Staff, and presented to Defense Secretary McNamara during his first week in office, the position advocated by this report was swept away by supporters of counterforce from Rand, the Air Force, and elsewhere. Kaplan provides no clues about where the ideas in WSEG-50 came from.)

Likewise, except for an occasional glimpse of Dwight Eisenhower and other national leaders, Kaplan gives few clues as to the larger forces involved in the making of U.S. defense policy. These political, economic, even psychological pressures propelled the nuclear arsenal to the vastly excessive size it has achieved today, a scale that ultimately nullified the ideas of the defense intellectuals.

Gregg Herken, a young historian at Yale, has written what he describes as a history of the nuclear era, told from the viewpoint of the civilians—including the scientists—who advised on nuclear strategy. While the result is readable and even at times entertaining (it is filled with insider political gossip), it adds little to what is already known about the course of nuclear developments. Furthermore, although Herken is a historian, he has not attempted to trace either the actual flow of ideas or the development of policy positions. That is, this book has to be seen as, at best, an entertaining tale, not as intellectual or political history. In fact, many of those whom he interviewed have written their own books, providing greater detail and, in some cases, more insight than the brief overviews in *Counsels of War.*

Herken has told the story not only of the defense intellectuals but also of the scientists who received their nuclear baptism in the Manhattan Project and went on to serve as advisers to the government on nuclear matters. In this respect, his is a somewhat broader study than Kaplan's. However, the text contains serious weaknesses which make it a less useful book than Kaplan's.

In trying to cover an extended period of history in a readable fashion, Herken omits much of the context within which nuclear developments took place, as well as the details of the actual policy recommendations and actions his interviewees were debating. His treatment of arms control is skimpy. He discusses the scientists' views on various arms control issues but leaves the actual measures they were talking about unclear. He has lengthy chapters on the SALT I and SALT II negotiations but fails to describe the contents of either agreement. Similarly, he describes the views of various persons involved in the formulation of the Carter Administration's Presidential Directive 59, without telling the

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reader that this controversial document advocated the development of strategies for waging limited nuclear war.

The book is flawed as well by frequent misstatements of fact. Well-known chemists are identified as physicists, scientists employed as government staffers are identified as outside advisers, and references to the involvement of Americans in analyzing World War II bombing campaigns are incorrect in a number of important details. The *Bulletin* and the Federation of Atomic (now, American) Scientists are both said to have been started in 1947; in fact, both were set up immediately after the war, in the fall of 1945. These factual errors make the reader wary of trusting the content and interpretation of Herken's interviews which, of course, cannot otherwise be documented. Since the interviews deal with events that took place 20 and more years ago, the reader naturally wonders to what extent they are colored by the benefit of hindsight.

Herken also traces the disagreements over nuclear policy between Edward Teller and other Manhattan Project scientists—from their work at Los Alamos to their disagreements over SALT II. But he does not explore, or even identify, the differences in character and outlook that generated this divergence in policy recommendations, which continues even today in the Star Wars debate. He refers cryptically to "unstated arguments" as being key in these disagreements, but then fails to explore what they were.

Like Kaplan, Herken alludes repeatedly to other political forces (for example, congressional pressures and military influences) but fails to come to grips with them directly. He refers a number of times to Air Force suspicion of outside experts' influence, but he does not explore how the Air Force was able to undermine the experts' recommendations, both within the executive branch and in Congress. There are a number of references to a "technological imperative" which requires that every offensive weapon that can be conceived must be built, but the book offers little understanding of the cultural or political factors in American society responsible for this.

Again like Kaplan (though with less consistency and insight), Herken points to the failure to make the nation's actual nuclear strategy—as embodied in the military's war plans—conform to the strategic approach desired by the political leadership. While the declared policy was one of deterrence, the actual policy in war-planning was one of nuclear war-fighting. (Now, in the Reagan Administration, this has become the official policy as well.)

Ultimately, the shortcomings of these two books suggest that we need more than a history of defense intellectuals—we need a deeper look at defense politics and institutions. Rather than continuing to rehearse the story of the strategists and advisers, we need to arrive at a better understanding of the elemental political and psychological forces that have nullified even the best ideas for controlling nuclear weapons. ☐

Leonard S. Rodberg teaches urban studies and energy policy at Queens College in Flushing, New York. He served as chief of policy research in the Science and Technology Bureau of the U.S. Arms Control and Disarmament Agency during the early 1960s.

Missiles for the Nineties:
ICBMs and Strategic Policy
edited by Barry R. Schneider,
Colin S. Gray, and Keith B. Payne
Westview Press, 1984
169 pages, $17.50

reviewed by Art Hobson

The eight essays in this collection are a contribution to one of the most debated defense topics of the past decade. Described by its editors as a "comprehensive examination of U.S. ICBM modernization issues," the book is essentially a position paper in support of the MX and the new single-warhead, small intercontinental ballistic missile (SIBM).

Barry Schneider is senior defense analyst, Colin Gray is president, and

Keith Payne is executive vice-president at the National Institute for Public Policy (NIPP), a conservative strategic "think tank" established during the early years of the Reagan Administration and which currently provides consultants to the Defense Department. Five of the eight essays are authored or coauthored by the three editors. The other contributors are Michael Ennis, Blair Stewart, and Dan Strode. All except Stewart have been analysts at NIPP.

A sampling of the main issues and positions: Should the strategic triad be maintained? Yes. Should ICBMs be maintained? Yes. What is the ICBM's main role in deterrence? Quick response against hardened targets such as missile silos. Should the MX be deployed? Yes. How? In Minuteman silos. Will MX be vulnerable in Minuteman silos? Not significantly, due to Soviet attack uncertainties. Should SIBM be deployed? Yes. How? On hardened mobile launchers, in superhard silos, or perhaps deep underground. Would a completely successful Strategic Defense Initiative (SDI) permit reduced reliance on ICBMs? No. What about a less successful SDI? Then we will need additional ICBMs. How will the Soviets view all this? They will see it as a first-strike threat.

All but the last three of these positions appeared in 1983 in the report of the President's Commission on Strategic Forces (the Scowcroft Report), and in fact much of the book restates the Scowcroft positions and arguments.

The positions set forth in the essays rest on several broad, unexamined assumptions. The most pervasive of these is the "cultural asymmetry" assumption, according to which the highest Soviet values are the country's control structure and military forces, including especially its missiles, while the highest U.S. values are its people. This deeply anti-Soviet position appears again and again, underlying most of the positions taken. For example, a U.S. countersilo capability (the ability to destroy missile silos) is justified on the grounds that, since the Soviets can clearly threaten our highest values (people), we must threaten theirs (missiles). Like most of the ideas in this book, this one is not new; it was stated by the Scowcroft Commission and used to support the same positions. Furthermore, it is an idea that is far from self-evident, but it is adopted by the authors without analysis and not acknowledged as an unsupported assumption. Thus, whether the assumption is true or false, it is used in an unscholarly way.

Some of the more original ideas contradict previous positions by the same authors. Chapter 7, for example, is a lengthy exposition of the proposition that the MX missile will be reasonably survivable in Minuteman silos, because of uncertainties in a Soviet countersilo attack. For MX supporters this is indeed an original position; until just a few years ago, they had argued that MX was needed precisely because Minuteman silos presented a "window of vulnerability." In his book, *Strategy and the MX,* Colin Gray stated that "there is now no way to protect the U.S. land-based missile force which can be effected in time so as to foreclose the Soviet achievement of a near total hard-target kill capacity in the next two years." That was in 1980, when a survivable MX basing mode was being sought, and prior to the Scowcroft Commission's 1983 recommendation to deploy MX in Minuteman silos.

The book does make several significant and sensible arguments. This is especially true of the last essay, by Strode, on Soviet views of U.S. ICBM modernization. This chapter, based on informative quotations from a wide range of authoritative Soviet sources, shows that:

- the Soviet Union really does fear a U.S. first strike and views MX and SIBM as important contributions to this capability;
- this situation is pushing the Soviets toward a "lowered response time," that is, toward greater reliance on launch-on-warning;
- the Soviets do not believe that an intercontinental war can be kept limited;
- the Soviets have a preemptive counterforce philosophy—if they think we are about to launch they will preempt.

The volume's most serious flaw is its technical errors and oversights. Most of the articles are characterized by imprecise, incomplete, unquantitative thinking about technical points that require precise, complete, quantitative analysis. For example, Schneider's essay on superhard silos is entirely nonquantitative about crater sizes, distances at which silos would be destroyed by blast, and missile accuracies. Such matters are not exotic scientific "extras"; they are in fact at the heart of the question of SIBM survivability in superhard silos.

Worse yet, even purely qualitative statements are sometimes technically incorrect in important ways. One instance is Schneider's assertion that "until future ICBMs are deployed with terminal guidance and MaRVs capable of making last minute corrections, cratering effects rather than blast overpressure may be the dominant kill mechanism" against superhard silos. But it is not true that cratering destruction versus blast destruction is determined by the accuracy of the missile. It is determined entirely by the blast hardness of the silo. That is, all silos below a threshold hardness of perhaps 50,000 pounds per square inch (psi) must be destroyed by over-

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Thomas Swick, United States

pressure (or by both overpressure and cratering if the miss distance is smaller than the crater radius), whereas all silos above this threshold must be destroyed by cratering.

Schneider's statement that superhardening "could remove entire categories of important Soviet targets from the reach of U.S. nuclear forces" does not recognize that MX, SIBM, and Trident II will all have a 75 percent probability of destroying 50,000 psi superhardened silos, provided that two warheads are used against each silo. Nor is it pointed out that Soviet missiles will not have this capability against U.S. silos, at least not until around the end of the century. Figures on single-shot and double-shot "kill" probabilities are given with no discussion of their origin or limitations. A ballistic missile defense of 50 percent effectiveness is assumed, for purposes of a particular comparison, with no mention of why one should assume 50 rather than, say, 10 or 90 percent.

Ennis, writing on the advantages of SIBM plus MX as opposed to SIBM alone, says that "targeting a small mobile missile creates the incentive to deploy a large number of smaller yield warheads to barrage large operating areas." Despite its intuitive plausibility, this statement is wrong: for a given number of missiles, the area barraged is the same, regardless of whether each missile carries one large warhead or any number of smaller ones. Ennis repeats this incorrect argument three times and uses it as major support for his position that the United States needs both SIBM and MX rather than SIBM alone.

Another of Ennis's crucial but technically unexamined assertions is the notion that MX is needed to fill a purported six-year time-lag between MX and the earliest reasonable SIBM deployment. But industrial sources state that SIBM could be deployed in Minuteman silos well before the 1992 date he assumes. The obvious alternative of putting SIBM temporarily in Minuteman silos is not mentioned. The issues here have to do with missile research and development and with the SIBM guidance system in particular, and are not investigated in the Ennis article.

An alarming unexamined technical assertion is Ennis's opinion that MX plus SIBM will not pose a serious first-strike threat to the Soviets because not enough U.S. warheads will be available. Such an important statement needs to be backed up with at least a roughly realistic calculation of the number of surviving Soviet warheads after plausible first strikes by the full U.S. strategic force. In a document purporting to be a "comprehensive examination of U.S. ICBM modernization issues," such technical errors and omissions are serious flaws.

Despite its drawbacks, the book is a useful addition on the conservative "side" of the strategic debate. It is always helpful to have clear-cut presentations of significant points of view, for it is partly by this procedure that we can eventually sort out the truth.

Summing up his chapter on Soviet views, Strode states: "In particular, [the Soviets] believe that MX and SIBM would be most useful in a first strike attack." This statement demonstrates the seriousness of the issues under discussion, a seriousness that merits the very highest scholarly endeavor. Unfortunately, *Missiles for the Nineties* falls far short of this goal. ☐

Art Hobson is a professor of physics at the University of Arkansas, Fayetteville. He recently spent six months at the Stockholm International Peace Research Institute, where he completed a comprehensive study of the small ICBM. All calculations and documentation supporting the review may be found in the report on the small ICBM, available from the author for the cost of photocopying.

The Public and Atlantic Defense
edited by Gregory Flynn and
Hans Rattinger
Rowman and Allanheld, 1985
398 pages; $45.00

European Security and France
by François de Rose
translated by Richard Nice
University of Illinois Press, 1985
143 pages; $19.95

reviewed by Leon V. Sigal

Popular attitudes toward NATO's doctrine of nuclear deterrence are a bundle of contradictions. That is the major conclusion of studies of poll data from seven NATO countries—Great Britain, France, West Germany, Italy, the Netherlands, Norway, and the United States—assembled by the Atlantic Institute. Strong support for nuclear deterrence in the abstract is the rule in all seven; but support turns to ambivalence about the specifics of putting NATO doctrine into practice, and to outright opposition whenever actual use of nuclear weapons is contemplated.

Even in France, where antinuclear protests have been muted, 58 percent of those polled thought that nuclear weapons should not be employed even "in a case where France was on the point of being invaded." Similarly strong support exists for conciliation and arms control, but the consensus begins to break down once the poll-takers ask about the particulars. The authors are at a loss in explaining these apparent contradictions. Renata Fritsch-Bournazel attributes the French attitude to "ignorance of the logic of deterrence," but it just as easily could reflect an intuitive appreciation of the flaws in that logic.

Europeans strongly embrace membership in NATO, which many regard as synonymous with alliance with the United States. Belief in the reliability of the U.S. commitment to come to Europe's aid remained remarkably high throughout the past decade. Asked in 1982: "If Britain's security was threatened by a Russian attack, how much confidence do you have in the United States to do whatever is necessary to defend Britain, even if this risked a direct attack against the United States itself?" 20 percent of Britons queried responded "a great deal" and 36 percent, "a fair amount," while just 12 percent said "none at all." Sizable majorities in France and West Germany shared this faith in NATO.

But NATO's decision to deploy cruise and Pershing II missiles in Europe put this support for the Alliance to the test. The decision raised the prospect that commitment to NATO might mean unwanted embroilment in a conflict that could escalate to the nuclear level. Asked in 1981 which represented a greater threat to Britain's security, "the presence of Soviet missiles in Eastern Europe" or "the proposed installation of American missiles in Western Europe," 43 percent replied the former, 29 percent the latter, and 28 percent did not know—an extraordinary expression of doubt.

While the editors try to put the best face on the potential for disaffection, Ragnar Waldahl's essay, noting the latent contradiction between "substantial support for NATO membership" and "strong fear of and opposition to nuclear weapons" in Norway, warns: "A continuous focus on such aspects of Norwegian defense policy where, as in the case of the double-track decision, there is considerable opposition in the population against official Norwegian policy, cannot but lead to major effects in the long run, unless other domestic and international factors were to counteract this influence."

Soviet actions, somewhat surprisingly, are not among those factors. Europeans have lived with the Soviet threat for so long that they no longer are much aroused by new manifestations of it. Attitudes toward military power, Soviet or Western, not those toward the Soviet Union, are the primary determinant of support for Western policy toward Moscow: "As a result, policies to deal with the growth of Soviet military power will have to be justified in terms that go beyond simply evoking a negative image of the Soviet system or Soviet objectives." Yet, as the authors show conclusively, attitudes toward military power, unlike those toward the Soviet Union, are marked by ambivalence.

What accounts for this ambivalence? Almost all the authors argue that attitudes toward defense, including nuclear weapons, have low salience for most people. Publics have little detailed information and little interest in gathering more. As a consequence, they find it easy to live with inconsistency. (It may be that those for whom attitudes about defense and nuclear weapons are very salient hold consistent beliefs, but this is a hypothesis the authors never put to the test.) But all of this only begs the question of whether an increase in salience of attitudes and in information would lead people to reconcile their conflicting beliefs.

Indeed, the authors may be reversing cause and effect. It is at least as tenable to argue that the dilemmas of nuclear deterrence are such that no logically consistent set of beliefs is possible. Faced with irreconcilable beliefs about such fundamental matters, most people put them out of their minds or resort to denial or resignation—"fatalistic awareness" is Ivor Crewe's well chosen phrase—whenever they are forced to think about them. After all, none of the experts who have studied these issues intensively have been able to formulate a logically consistent set of policies which reconcile all of the important issues that nuclear weapons raise.

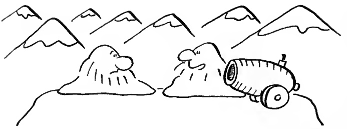
It may be that most people already know enough to understand that NATO's nuclear doctrine presents unresolvable dilemmas. The more salient they become, the greater public ambivalence, denial, and resignation. Nothing so clearly suggests this as the finding that, despite repeated declarations of policy over the past 40 years, 82 percent of the American public remains unaware that it is the professed intention of the United States to use nuclear weapons first, if need be, in the event of a Soviet invasion of Western Europe.

Analysis of public opinion is the modern equivalent of soothsaying. And it is possible to read almost as much into poll data as into chicken entrails, for two fundamental reasons:

- No one understands much about what poll results tell us regarding the importance or impact of certain attitudes, or about the link between the salience of these attitudes and motivation. What makes an attitude matter enough for a person to act on it? Without a valid measure of this importance, moreover, it is difficult to establish whether the views poll-takers record represent opinions or are merely a reflection of how they phrase their questions: a "nonopinion." Insofar as the polls frame issues the way government and opposition spokesmen do, they may only be measuring the immediate effect of propaganda dissemination through the mass media.
- We do not yet know how various attitudes relate to each other logically and psychologically; which attitudes matter most; which are likely to change in response to new information or other stimuli; which are resistant to change. Much remains to be done in formulating the theory of attitude structure and change.

The virtue of *The Public and Atlantic Defense* is that it makes the shortcomings of public opinion analysis clear—sometimes unintentionally, by making too much of some findings and qualifying others to the point of denying the obvious. But in the best of the essays, Ivor Crewe's, it consciously and explicitly sets out the limitations of the findings.

These limitations are often a source of unpleasant surprises to policy-makers and others who attempt to press at the bounds of what is publicly acceptable. One such attempt is François de Rose's *European Security and France.* De Rose, France's ambassador to NATO from 1970 to 1975, does not share the disdain of some of his countrymen, particularly the elites, for allying with the



Rex May, United States

"Oh, it's true enough that violence never solves anything, but the *threat* of violence often does."

United States, and he quickly establishes his credentials with Washington by dismissing those who question U.S. deployment of new missiles in Europe.

He will win few adherents in Europe with his cavalier treatment of critics of enhanced radiation weapons: "So let us leave the advocates of Soviet arguments to their own contradictions and return to our own problems." One of those problems, however, is his advocacy of "inflexible response" to replace flexible response:

> The idea would be that, having maintained their determination to make use of nuclear weapons when, where and as the course of events might make it necessary, the Western powers would demonstrate [inflexible response's] defensive character in an irrefutable way by restricting their first use to attacks on forces that had already invaded Alliance territory. It goes without saying that it would be preferable to use enhanced radiation weapons so as to minimize the collateral damage caused to friendly territory.

What is minimum collateral damage to the nuclear theorist, however, may look like Armageddon to those in the vicinity, a point not lost on the French public in opposing the use of nuclear weapons.

Yet de Rose's key proposal is intriguing: a beefed up French conventional contribution to NATO in return for Alliance, that is, U.S., agreement on the conditions under which nuclear weapons would come into play, presumably along the lines of inflexible response. To the extent that de Rose is signaling a shift in French elite opinion about France's role in NATO, his proposal merits serious consideration. But it would not be the first time that nuclear strategists were misreading public opinion on the issues of NATO and nuclear weapons. ☐

Leon V. Sigal, author of Nuclear Forces in Europe *(1985), teaches government at Wesleyan University in Middletown, Connecticut.*

The Limits of Science
by P.B. Medawar
Harper and Row, 1984
116 pages; $11.95

reviewed by Langdon Gilkey

This is a strange and intriguing little volume. In its tone it is open and tolerant, eminently courteous, and daring. Here a Nobel laureate argues that not only are there essential limits to science; but even more, there are crucial questions which science can neither ask nor answer. "Truth is of many kinds," he assures us, "not all fully compatible."

All this from a distinguished scientific source is novel and a bit radical. But beneath the courtesy and the tolerance there remains an unyielding center: scientific theory represents the only legitimate meaning to "truth"—for only empirical and testable propositions can be true or false. Those questions which science cannot answer cannot be answered at all.

Medawar denies that he is "a doctrinaire positivist." Yet with regard to the thesis that truth is limited to empirically testable propositions, his position is identical with theirs. This mildly contradictory attitude toward "myth, metaphysics, imaginative literature and religion" runs throughout the book. It makes it enjoyable, often surprising, reading, but it also creates some difficulties for Medawar's argument.

While Medawar's courteous positivism represents the main theme of the book, it is in contrast to some of the more radical things he has to say about science, its procedures, and its limits. Among these wild oats are the following:

- A correspondence theory of truth is implicit in science. True propositions in science refer to corresponding states of affairs in reality. But it is hard for the reader to know how Medawar can make such clearly cognitive or existential statements about this "reality" to which the true propositions of science refer.
- Medawar affirms that certain emotions, virtues, drives, and commitments must be present or science is impossible.
- "There is no logic of discovery." A "variety of strategies" plus imagination represents the heart of science; thus its purported single method is split into a variety of *sorts* of inquiry.

These theses are wise as well as unusual, hardly part of the folklore of conventional positivism. In his interpretation of science, Medawar thus shows openness and tolerance. What is strange is how parochial and, yes, foolish his judgments are about religion and metaphysics. I do not refer to his disbelief in religious doctrines; I refer to his careless, uninformed way of talking about religion. Seemingly he thinks—as do many noted intellectuals—that religion is the one area you do not need to know anything about in order to discourse authoritatively upon it. Here are some examples:

- "I do not believe revelation is a source of information," Medawar writes. Neither have most significant theologians since about 1800. Medawar should at least have understood this if he was going to discuss the subject.
- "Religious explanations appeal to the agency of a *personal* God." This is wildly inaccurate, contradicted by many observation statements in the field of religion, and challenged by most serious mystical and many philosophical interpretations.

- "Myth fails the test in relation to real life." I think I know what he means: the literal recitals of myth do not check out as factual or historical statements. But to say "myth fails in relation to real life" is quite incomprehensible in the light of the understanding that myth has ushered us into real life. For many psychologists, dramatists, literary artists, and students of religion, myth opens up the obscurity and confusions of ordinary life, uncovering the nature of our deepest ills and the sources of our necessary hopes.

There are also logical difficulties with Medawar's remarks about metaphysics and religion. He categorizes metaphysics as one of those enterprises "outside of science" which are not and cannot be true or false because they cannot be empirically tested, although he concedes that metaphysics is not all "bunk" because it may lead to "scientific inspirations and fruitful scientific ideas." But in itself, if metaphysics claims to "know," it is a fraud; it must be distinguished from science and classed with religion and literature as "fancy and fiction." Like theology, metaphysics has nothing to tell us about the real. It is not a form of knowing in any sense.

Medawar's circular logic does not support itself: He defines metaphysics and religion, correctly, as quite *beyond* science; he then dubiously defines "reality statements"—and so reason and truth —as confined to science; he then triumphantly concludes that religion and metaphysics represent an abdication of reason. The argument holds only if both of his definitions, or premises, are accepted. But his own analysis of science casts doubt upon the second premise: in analyzing science he "knows" things about reality and the self that lie "outside" the logical limits of science. This demonstrates the dubiousness of any rationalism that centers itself on science as "knowledge" and then excludes everything outside science from its purview.

Medawar appears to leave the real world completely when he describes "science" as a historical movement, a human enterprise in modern society. Here he seems idealistic, a "true believer" enchanted with a myth. He believes that "the purpose of science is to make the world a better place." The noble intentions dominant in science are apparently enough to guarantee the purity of science's role in history. Science is, he avers, in no way responsible for our present serious, long-term dilemmas; only "political blunders" are to blame.

This is a nonempirical, in fact "mythical," view. Science is present not only in sheltered academia, where the purpose of gaining new knowledge for its own sake may well predominate; its far more important effects on the world come from its functions in industry and the military. There, clearly, it is driven by motives aiming at economic gain and military survival. When the crucial issue of the relation of science to possible catastrophe is raised, Medawar seems to think that the reference is only to a fear of the "mad scientist." And in response to that anxiety, he states somewhat grandly that "the citizens of the world of learning should be judged sane"—as if German science had not existed and prospered in the insane world of the Third Reich.

How to account for a wise man like Medawar writing such unrealistic, mythic pronouncements in a world deeply endangered precisely by the fruits of its vast intellectual prowess, of its science? Here is a mystery arising out of good intentions yet issuing in ominous results—results that defy this simple picture of good and brilliant people seeking to make the world better.

The issue is one of neither moral blame nor guilt, but rather of realism about science as a very human enterprise—like government, industry, and the churches—and realism about the vast ambiguity that each such enterprise, whatever its intentions, represents in real life. This ambiguity increases when any such enterprise gains dominance and controls vast powers necessary to human well-being and security. The very glory of science—of which Medawar is very much aware—is the condition of, not the antidote to, its ambiguity in the world. The sooner scientific leadership recognizes that ambiguity, rather than ignoring or denying it, the nobler will be its effects upon us.

The ambiguity, the pervasive mysteries, within contemporary life seem not to have manifested themselves to Medawar as they have to so many others. The mystery of our wills is one of those mysteries: our noble intentions, in science as in government and industry, tend to evaporate, to get muddied. And our "say" in what happens is never as great as that of the privileged, in any age. This is unfortunately real life. And real life again and again validates that many of the myths of the imaginative literature and the religion beyond science which Medawar finds so useless are precisely in touch with "reality."

Frequently in this volume, Medawar seems to look with tolerant kindness at one or another of his religious friends and to muse aloud: "His mind is too incisive and his spirit too sensitive to be *that* literal." I felt much the same way about Medawar himself, not in relation to his understanding of science but in his apparent unawareness of the ambiguity, the eeriness, the mystery of "real life," even in an age of science. ☐

Langdon Gilkey is Shailer Mathews Professor of Theology at the Divinity School of the University of Chicago.

The Missing Dimension: Governments and Intelligence Communities in the Twentieth Century
edited by Christopher Andrew and David Dilks
University of Illinois Press, 1984
305 pages; $27.95

reviewed by James Bamford

For many years, only journalists, former CIA directors, and disgruntled employees wrote about intelligence. And the only courses on the subject were taught in windowless buildings behind barbed and electrified fences. Rarely would a well documented, scholarly book on the subject turn up.

One of the first was David Kahn's massive history of cryptology, *The Codebreakers,* which appeared in 1967 and remains the model of the genre. Another pioneer was Harry Howe Ransom who wrote *The Intelligence Establishment* in 1970. But for the most part, intelligence was either too difficult or too insignificant a subject for serious historians to pursue.

In the mid-1970s, however, things began to change. First there was the publication in 1974 of *The Ultra Secret* by Frederick Winterbotham, a best-selling book about the British success in breaking the high-level German cipher system in World War II. Although Winterbotham's book, based primarily on his distant memory, contained many factual errors, it demonstrated dramatically the importance of intelligence activities in wartime.

The following year, as a result of abuses reported in the press, the U.S. Congress launched a year-long investigation of the U.S. intelligence community. Every night on national television many of the CIA's most closely held secrets were put on public display, giving further evidence of the major role played by intelligence organizations, not only in war but also in everyday foreign affairs and even in domestic activities. Equally important were the many volumes of reports and hearings which became a mine of information for historians, authors, and scholars.

Today the intelligence theme is slowly emerging from the darkness and taking on a new respectability among historians and the academic community. Courses on the subject are being offered on a number of campuses, and scholars are plowing through archives and newly released records for what Sir Alexander Cadogan once labeled "the missing dimension" of history.

The phrase serves as an apt title for this collection of essays on intelligence edited by British historians Christopher Andrew and David Dilks. Although the orientation of the chapters is decidedly British, there is nevertheless much information of interest to the American reader. "Intelligence," Andrew and Dilks argue, "has become the 'missing dimension' first and foremost because its written records are so difficult to come by."

The reasons for this only occasionally, and perhaps accidentally, have anything to do with national security. As the editors point out in their introduction, the standard by which some records are released and others remain hidden under classification stamps are frequently illogical. In Britain, for example, although a number of wartime records *about* intelligence have been released, none of the records *from* the intelligence services have been declassified. The government has even refused to set a date for the release of intelligence community records for the period before the *first* World War!

Britain, however, does not have a monopoly on illogical classification procedures. The U.S. National Security Agency recently *re*classified a 1938 analysis of a piece of pre-World War II cryptographic equipment, even though it had previously been declassified and sat on a public library shelf for many years. In another example, the CIA ordered former agency director Stansfield Turner to remove from his new book, *Secrecy and Democracy*, all mention of the name of the British intelligence agency, MI-6, even though it has been written about for decades.

Much of *The Missing Dimension* is devoted to the early days of espionage, long before technical means became the dominant method of intelligence collection. As Ian Nish relates in his essay on Japanese intelligence during the years leading up to the 1904–1905 Russo-Japanese War, the only way to see Siberia in the those days was to cross it on horseback. Among the best "intelligence riders" was General Baron Fukushima Yasumasa who spent 15 months in the early 1890s spying on the construction of the new Trans-Siberian Railway as he traveled through Siberia, Mongolia, and Manchuria. Today, although it is not mentioned in the book, a U.S. "Keyhole" satellite can photograph that same area about once very 90 minutes.

While Nish's essay is important in understanding how much things have changed over the past century, Andrew's piece on the French, British, and U.S. codebreaking organizations demonstrates how some things have not changed at all. At the turn of the century, for example, the French government operated *cabinets noirs,* or codebreaking units, in both the *Sureté* and the Foreign Ministry. Because of a complex misunderstanding the two organizations in 1905 broke off all cooperation with each other. "For the next eight years," Andrew writes, "the two rival *cabinets noirs* independently decrypted a substantial amount of diplomatic traffic—sometimes the *same* diplomatic traffic—without showing each other their results."

The same type of internecine warfare also affected the British and American cryptanalytic organizations. During much of World War I the British Admiralty's Room 40 refused all contact with the military codebreaking unit, MIlb. And in the United States during World War II, the Army's Signal Intelligence Service was constantly at war with the Navy's Op-20-G. This was finally resolved with what Andrew calls "a compromise of memorable absurdity": the Army would work on the diplomatic intercepts received on even days and the Navy would attack the traffic received on odd days.

Other chapters include David Kahn's excellent analysis of the major successes and failures in codebreaking during World Wars I and II, an informative piece by Alasdair Palmer on the demise of Britain's D-Notice system of official yet voluntary press censorship, and a useful article by Harry Howe Ransom on the CIA's search for legitimacy from 1947 to 1982.

The Ransom piece, unfortunately, is the only essay that discusses post-World War II intelligence activities. Although the book contains a great deal of information on early British cryptanalytic efforts, for example, no effort is made to bring the subject up to date. Instead of the standard chapter on Philby, Blunt, and the others—a topic which has been written into the ground—a fresh look at British postwar cryptology and the organization that controls it, Government Communication Headquarters, would have been far more useful. Yet despite this missing dimension, the book makes an important contribution to a neglected area of history. ☐

James Bamford, a writer specializing in national security issues, is the author of The Puzzle Palace *(1982), a book about the National Security Agency.*

Letters

Soviets and Star Wars

Stephen Shenfield's account of the Soviet Scientists for Peace paper in the June/July *Bulletin* was sadly misleading. Shenfield interpreted the paper as evidence for the possibility that "the Soviet leadership may in fact . . . restrict itself to taking countermeasures against the U.S. [space defense] system." Thus, the advent of Star Wars "may mark the occasion on which the action-reaction mold of the arms race is at last broken, giving a new and perhaps decisive impetus to the movement for human survival." But were these fine sentiments justified by the Soviet text?

The key section of the Soviet scientists' report, that on "Military-Strategic Consequences," opens with a careful distinction between active and passive countermeasures, including "various ground (sea), air or space-based weapons using either missiles or lasers." There follow five options in the "active countermeasures" category, some with a modicum of broad-brush military description. Then come two short and vaguer-sounding paragraphs about passive countermeasures, such as smokescreens and ablative coatings on missiles.

One of the "active" countermeasures listed by the Soviet authors, fake or dummy missile launches, is in fact a form of passive spoofing. Shenfield removes it from the active list without comment. Less legitimately, he condenses the relatively detailed Soviet list of four weapons-based countermeasures into the first of five unnumbered but emphasized points, into which he arranges the authors' views on possible countermeasures. He succeeds thus in considerably changing the "feel" of the report. The actual Soviet emphasis on weapons options for counteracting space-based antimissile systems is lost. In Shenfield's version, these options are hurriedly mentioned; then the passive spoofing or protection options are dwelt on.

But if Soviet leaders are seriously considering the weapons path, as well as passive countermeasures, in response to U.S. Star Wars systems, their programs are most unlikely to achieve the favorable cost-ratio of 1 or 2 percent which Shenfield reports the paper as forecasting.

Furthermore, the asymmetry of such a response would perhaps be somewhat less benign than Shenfield hopes. Anti-anti-missile weapons would have much in common, including physical and technical limitations, with antimissile and antisatellite weapons. Shenfield accepts this when discussing the recent Soviet silence with respect to their formerly much-demanded ASAT treaty, but he fails to see what it implies for any understanding of a possible Soviet decision "not to proceed with Star Wars development."

Soviet advisers and analysts can be perfectly honest when giving such useful signals to Western observers, because, like the authors of the Soviet report, all they choose to mean by "Star Wars" and related expressions is very low leakage antimissile area defense with directed energy weapons. Put like that, however, not even the strategic defense initiative itself seems likely "to proceed with Star Wars development" as the next action-reaction phase of the arms race. The Soviet paper, in fact, grimly suggests that those weapons which SDI seems most likely to produce in the foreseeable future—ASATs, anti-tactical missiles, and various point-defense technologies—will be matched, not merely "countered," by them.

None of this is to quarrel with what the Soviet paper says about the destabilizing effect of such systems and the damage they threaten to inflict on the arms control process. However, we should not let Stephen Shenfield persuade us to read large helpings of sweetness and light into a major Soviet document on military policy which contains precious little of either. There is, of course, a synonym for "active countermeasures": "the action-reaction mold of the arms race."

Rip Bulkeley
Oxford
United Kingdom

* * *

Stephen Shenfield's response: Rip Bulkeley accuses me of deliberately downplaying the Soviet report's emphasis on active, as against passive, countermeasures to Star Wars. In fact, it devotes approximately equal attention to the two, dealing with four of each (if, as seems

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reasonable, dummy missiles are counted as passive). The active measures envisage destroying, or putting out of action, the space laser platforms by: relatively small ballistic missiles; "space mines" (satellites in orbits close to those of the laser platforms and equipped with short-range means of destruction); land-based lasers; and obstacles laid along the trajectory of the laser platforms.

Purely for the sake of brevity, I listed these four measures under a single point. Each of the four passive measures is based on a different principle and so had to be given a separate point. If I created thereby an imbalanced impression, it was unintentional, and I am disconcerted at being so casually assumed to be guilty of calculated pro-Soviet bias.

Bulkeley's main argument revolves around the meaning attached to Star Wars by Soviet commentators. He states that the authors of the Soviet report have in mind only "very low leakage antimissile area defense." But had he read the report with the care it deserves, he would have known that it assesses such a defense as impracticable in the foreseeable future. On the other hand, the report expects much more from Star Wars over the next decade or two than the marginal elements judged most likely by Bulkeley. Soviet analysts envisage an antimissile area defense, but one with substantial leakage. Such a defense could, they fear, be viewed by U.S. strategists as of little value against a Soviet first strike, but as offering a worthwhile measure of protection against a Soviet counterstrike to a U.S. first strike which impeded the Soviet Union from taking countermeasures against Star Wars. Thus there would be pressures on both sides to preempt.

Soviet experts who advise against a Soviet Star Wars program are therefore taking a nonimitative approach in relation to what they expect from the United States in coming years. They may indeed be making an alarmist misjudgment of the real situation, so that military developments turn out to be similar on both sides. Worst-case analyses of the adversary's prospective capabilities feed the arms race from both sides.

Notwithstanding the dangers inherent in Soviet active countermeasures, a Soviet repudiation of Star Wars would still represent a shift away from the traditional pattern of imitation, possibly facilitating the emergence of a concept of "sufficiency" in Soviet doctrine. This is not necessarily a matter of "sweetness and light": the main factor appears rather to be the need to limit the economic burden of armaments. But whatever the immediate motivation, there is surely at least a little room for hope.

My argument was not, as one might think from Bulkeley's letter, based solely on the Soviet scientists' report, but also on statements made by other Soviet figures, notably Academician Yevgeny Velikhov, and on the evidence of informants who cannot be identified.

Pressuring the Soviet Union

In his review of Richard Pipes's *Survival Is Not Enough: Soviet Realities and America's Future* (April 1985) Coit Blacker neglects an important theme of the book, which, paradoxically, further contradicts Pipes's own conclusions: the essentially Russian character of the Soviet state.

Americans of either liberal or conservative persuasion generally appear to believe that most Soviet citizens share their values and would choose a democratic society if they were free to do so. Yet, as Pipes makes clear, Russian culture has never possessed the requisite tradition of respect for the rule of law. Russians admire power and take authoritarianism for granted; most of the institutions of the Soviet state derive directly from those that existed under the tsars.

After reading Pipes's description of Soviet society, which is generally corroborated by less conservative writers, I am completely unconvinced that economic pressure will lead to any liberalization of Soviet society. In the extremely improbable event that economic collapse brought about the overthrow of the present regime, the only likely result would be a fascist-style military dictatorship, even more antisemitic and xenophobic than the present one.

Soviet economic weakness and the general corruption of society may be of benefit to the United States, in the sense that a more efficient enemy would be a more formidable one. But in urging that the United States seek to further undermine that economy, Pipes overlooks the fact that the most powerful appeal the Soviet rulers have to their people is to their great patriotism. As long as the system decays under its own weight, individual self-interest will help it along. To the extent that the United States is seen as the source of their troubles, however, the workers will rally to do the state's will.

Finally, after convincing the reader that Soviet leaders' primary values are not ideological but rather center around maintenance of their personal power and material comfort, Pipes then expects us to believe that they are nonetheless committed to gambling with these privileges in risky ventures to spread international communism. But, in fact, the Soviet empire's colonies are an economic liability. If Pipes were correct about the utility of economic pressure, maybe the United States should make only token opposition to Marxist-Leninist revolutions and saddle the Soviet Union with a few more client states.

John H. Caster
Southern Illinois University
Carbondale, Illinois

Nuclear-free zones

How is it possible that the *Bulletin* could devote five articles and 20 pages to "exploring the concept" of nuclear-free zones ("Nuclear Allergy," June/July 1985) without once mentioning any of the over 2,300 locally declared nuclear free zones that now exist in 16 countries? It is this grass-roots nuclear-free-zone movement—and not the pronouncements of prime ministers or arms control experts—that is responsible for spreading the nuclear allergy.

The national and regional initiatives reported in the *Bulletin* have come only in response to the pressure generated by local campaigns. Over 65 percent of the people in New Zealand, England, and Spain, for example, live in nuclear-free-zone cities and counties. In Ireland the figure is over 50 percent and in Japan over 30 percent. Given this degree of public support, it is no wonder that politicians and the military are beginning to take nuclear-free zones seriously.

The grass-roots nuclear-free-zone movement certainly cannot be dismissed as "only symbolic." This is true even in the United States, where more than one-third of the 91 nuclear-free zones are legally binding, and all have succeeded in keeping out nuclear weapons industries. Three U.S. cities—Takoma Park, Maryland, Amherst, Massachusetts, and Hoboken, New Jersey—have gone so far as to refuse to do business with nuclear weapons contractors, making such corporate giants as AT&T, General Electric, and Westinghouse ineligible for public contracts. Over 125 other nuclear-free-zone campaigns are underway.

Nuclear-free-zone communities around the world are thinking globally and acting locally, refusing to be defended by the use or threatened use of nuclear weapons and refusing to support the nuclear arms race in any way. The message being sent is clear: "No. Not here. Not in our name."

Albert Donnay
Nuclear Free America
Baltimore, Maryland

A nuclear-free zone in Canada

The June/July issue of the *Bulletin* with its focus on nuclear-weapons-free zones came at a most appropriate time for those involved in the peace movement in Manitoba. On May 30 the provincial legislature unanimously approved a resolution declaring the province a nuclear-weapons-free zone. Manitoba thus becomes the first Canadian province to be so declared (64 cities and towns in Canada have passed similar resolutions).

Though largely symbolic, the resolution indicates the political strength which regional peace groups possess. In Manitoba the zone was the culmination of a seven-month campaign conducted by several organizations.

We are now working on means to strengthen the resolution. Members of

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our committee plan to meet with local business and labor leaders asking them not to bid or work on U.S. nuclear weapons contracts. (The local Boeing plant bid on but lost an MX contract three years ago.) Canadian Prime Minister Brian Mulroney and the entire Parliament will be asked not only to acknowledge the zone but to honor its intent. (Although Canada has no nuclear weapons on its territory, we are involved in NORAD and NATO as well as the production of components for various nuclear weapons systems, such as the guidance system for the cruise missile by Litton Industries in Toronto.) Letters have been sent to various world leaders, including President Reagan and Soviet leader Gorbachev, requesting that they declare similar zones in their respective countries.

We also feel that there are educational objectives to be gained from the passage of this resolution: increased awareness of the role Manitoba plays in the nuclear arms race; identification of areas of jurisdictional control that the province might eventually exercise when enforcing a nuclear-weapons-free zone; encouragement of Canada's peace-making role in the world; and development of increased trust and confidence around the world for disarmament initiatives.

Martin Zeilig
Winnipeg Coordinating Committee
for Disarmament
Winnipeg, Manitoba, Canada

Nagasaki bombing

In the spate of comment generated by the fortieth anniversary of the atomic bomb, including your superb anniversary issue, much attention has been given to the decision to use "*the* bomb." But there were *two* bombs. No more in this retrospection than in the original decisionmaking is there evidence of serious thought about whether we might not have stopped with one. Many endorse the position taken by the U.S. government in 1945 that nuclear attack was necessary to save American and Japanese lives that would have been lost in an invasion of the home islands. Do they by this argument claim that two weapons were needed to bring about such a result? The political leadership in 1945 did not appear to give thought to this.

It took two days for the Japanese to verify what had hit them at Hiroshima. When the news about Nagasaki came on the third day, the Imperial War Council was in session discussing surrender. It is hard to imagine a faster reaction under Japanese political processes existing at the time. Too little attention appears to have been given to allowing the Japanese a sufficient period in which to react to the first bomb before dropping the second.

My own view, for what it's worth, is that Hiroshima was defensible but that Nagasaki was not.

Benjamin S. Loeb
Bethesda, Maryland

Just war

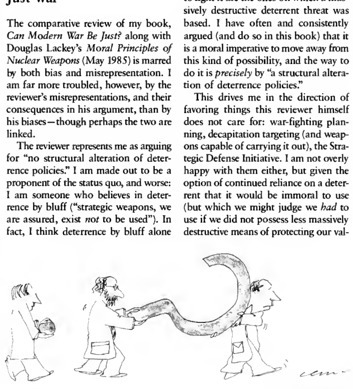
The comparative review of my book, *Can Modern War Be Just?* along with Douglas Lackey's *Moral Principles of Nuclear Weapons* (May 1985) is marred by both bias and misrepresentation. I am far more troubled, however, by the reviewer's misrepresentations, and their consequences in his argument, than by his biases—though perhaps the two are linked.

The reviewer represents me as arguing for "no structural alteration of deterrence policies." I am made out to be a proponent of the status quo, and worse: I am someone who believes in deterrence by bluff ("strategic weapons, we are assured, exist *not* to be used"). In fact, I think deterrence by bluff alone is nonsense, and I have said so many times, both in print (in this book and elsewhere) and in lectures.

The passage to which the reviewer is referring begins as a thought experiment: "perhaps, as some theorists argue . . ." and ends with a call for "the progressive development of less massively destructive means of deterrence and . . . the provision of effective means of defense and war-fighting capability." The former reflects the thinking of others and is what the reviewer picks up; yet my own thought is the latter. Indeed, it is a continual theme of this book that we must move beyond deterrence as it stands.

In the short run, perhaps the best we can do is to accept tentatively the argument of those who insist that deterrence has worked; yet what bothers me is what will happen if we get into a war and find that the only weapons we have to fight it are the ones on which a massively destructive deterrent threat was based. I have often and consistently argued (and do so in this book) that it is a moral imperative to move away from this kind of possibility, and the way to do it is *precisely* by "a structural alteration of deterrence policies."

This drives me in the direction of favoring things this reviewer himself does not care for: war-fighting planning, decapitation targeting (and weapons capable of carrying it out), the Strategic Defense Initiative. I am not overly happy with them either, but given the option of continued reliance on a deterrent that it would be immoral to use (but which we might judge we *had* to use if we did not possess less massively destructive means of protecting our val-



Richard Cline, United States

ues), they represent the better choice. In any case, there would certainly be no reason for me to go out on a limb to favor these controversial defense options if I held the position on deterrence the reviewer claims I hold.

Another outright misrepresentation is the following: "Anomalies plague Johnson's historical approach. He argues that just war tenets are valid in the nuclear age by citing recent examples of limited war, such as the Falklands. But his application of the evidence of limited conventional war to support a case for limited nuclear war is manifestly fallacious. History provides no examples or 'analogies' of limited nuclear war. This bald fact is completely ignored in Johnson's assurances that limited nuclear war is possible."

In fact I make no such connection between the Falklands and limited nuclear war. The chapter in question explores the possibility of justice in five distinct types of cases: strategic nuclear war, armed conflicts involving tactical/theater nuclear weapons (a type of limited nuclear war), conventional armed conflict between established powers (here's where I treat the Falklands war), insurgency/revolutionary conflict, and terrorism. The discussion of the possibility of limited nuclear war is over and done with when the Falklands war comes up. I never link the two at all, contrary to the reviewer's claim.

Anyone who wants to know what *Can Modern War Be Just?* really argues before buying the book had better go elsewhere than to the review carried in the *Bulletin*.

James Turner Johnson
Rutgers University
New Brunswick, New Jersey

* * *

Richard Miller's response: Permit me first to correct a misstatement I made in reviewing Douglas Lackey's *Moral Principles and Nuclear Weapons*, where I stated that Lackey fails to consider the differences between unilateral and bilateral disarmament. However, the reader will find such a discussion on pages 225–26. Lackey confines his evaluation of bilateral disarmament to considerations of the common good, one of four ethical criteria by which he tests other nuclear policies. The reader might hope for more, but this amendment cannot replace my previous error.

About Johnson's objections: He concedes that "in the short run" he "tentatively" accepts a massively destructive deterrent threat. (Incidentally, one fails to find these qualifiers in the original work.) It is just this "tentative" acceptance that I put to critical scrutiny, after noting that Johnson embraces a warfighting position. Johnson's tentative acceptance turns on the confidence that deterrence has worked, a claim for which he provides no argument, in either his letter or his book. Such confidence rests on the apparently beneficial consequences of deterrent threats. But without an argument to support it, Johnson's case rests on the erroneous assumption that because one event follows another, the second was caused by the first. His book's penultimate word on deterrence—"moral purposes may sometimes best be achieved by not entirely savory means"—hardly suggests a structural alteration of deterrence.

Concerning conventional and limited nuclear war: The connection between evidence of restraint in the Falklands war and Johnson's case for limited nuclear war is arguable, but it is surely secondary to my point. My criticism focuses on the premises of Johnson's *method*. Given the fact that he wishes to draw analogies from past conventional wars and just war theorists, it is vital for his method that there be no great difference between conventional and nuclear war. Yet history can provide no assurance that nuclear war will be fought in conventional terms.

Part of Johnson's argument that limited nuclear war is possible rests on the survivability of communications systems in the heat of nuclear battle. Such factual considerations seem to strengthen the case, important for Johnson's method, that no radical difference necessarily separates conventional and nuclear war. Yet he jeopardizes his own methodological premises by embracing a decapitation strategy. Decapitation undermines the survivability of communication systems—the factual necessity upon which Johnson's methodological premises rest.

Herbert Scoville, Jr., 1915–1985

The *Bulletin* was saddened to learn of the death, on July 30, of Herbert (Pete) Scoville, Jr., a founder and, since 1979, president of the Arms Control Association in Washington, D.C. Trained as a physical chemist, Scoville spent a number of years in government service—as technical director of the Defense Department's Armed Forces Special Weapons Project from 1948 to 1955, deputy director for research and technology at the CIA from 1955 to 1963, and assistant director for science and technology at the Arms Control and Disarmament Agency from 1963 to 1969—before turning fulltime to the effort to control the nuclear arms race. In his two books, *Missile Madness* and *MX: Prescription for Disaster,* and numerous articles Scoville sought to disseminate as widely as possible information about the arms race and its dangers and to encourage negotiations between the United States and the Soviet Union as the key to strategic stability.

The value of his contributions was best expressed in the citation accompanying Princeton University's granting of the Rockefeller Public Service Award to him in 1981: "His expertise in educating policy makers and the public is considered of major significance as nations confront again the imperative of arms control. . . . Pete Scoville has come to symbolize a courageous vision of a more cooperative and less fearful world."

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